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EDITORIAL NOTES.

Toluol Production—The Naphthalene Question.

MUCH interest has been evinced in the editorial article in last week's issue in which all who have influence in the matter were urged to work with the view of securing the maximum yield of toluol—urged because there is no question as to the necessity and the exigency. The article, we hear, has already acted as a stimulus; and there is assurance that it will assist in promoting a healthy rivalry in doing the best possible for the country in this regard. There are isolated cases—thank goodness they are isolated—in which even the matter of the extraction of toluol from gas has been put into the balance as a business proposition, to ascertain the weight of the relative credits and debits so as to see whether there is a substantial margin to justify compliance with the requirement. What is thought of those directing such undertakings is not in their favour. The gas industry is not a philanthropic institution. It is an industry carried on with no motive ulterior to the securing of a fair return on the capital invested, of some reward for enterprise, and of an accretion of strength and power through the development of interests, processes, and services. But the general feeling in the industry is one of gratification that it is its good fortune to be in the position to assist the country in an exceptional manner in an extreme and unparalleled crisis. While it is only right that the industry shall not financially suffer through this, such a consideration is, with a majority of men in the industry, the last thing to be thought of as limiting what is both a duty and a privilege. The response to duty and to privilege must have ascendancy over all else when every drop of toluol that can be produced is of value to the country, even though the procuring of it brings in its train some slight, but not irremediable, inconvenience.

The article in last week's issue has brought to us some private letters and personal communications. It is a pleasure to hear of instructions having been given to see that nothing is left undone to realize the best possible returns, and to try and exceed the past returns from the works. This is the spirit that the article was intended to engender; and if such spirit operates in every case, the object will have been served. There was appeal in the article to the smaller works to do their part. Among communications is information which shows that a number of small works had already responded to the prior appeal. They are doing their "bit." We were aware of it. But there are a not inconsiderable number that are not. There is a recruiting poster on our mural surroundings with the smiling face of a "Tommy" on it, and the words underneath: "He is doing his bit, and is "satisfied. Are you?" The words may be adopted for application in connection with the work on toluol. One correspondent says that some very small gas-works are being pressed to adopt the "C" process, although there is not the slightest chance of this being done with the plant at disposal, and although there is only a working foreman to look after it. In some small works in the country, the ammonia returns would be in normal times all the better for an addition to the scrubbing plant now, when toluol is such a pressing essential, in enormous quantity, through the tremendous hourly expenditure in the various theatres of war. As to the working foreman and supervision, there is no question that supervision is needed for the process. But, given sufficient scrubbing plant, where there is the will, there can be found a way. Most of the small works are under the supervision for general working of an engineer of a larger works not far distant; and where they are not, it would not be an unpatriotic act for some competent person from a larger works to make a periodical inspecting tour to neighbouring small works, and render closer help and more immediate advice than is possible by those who are officially engaged in "visiting" work over large areas.

One complaint made, in the name of the smaller works, is that it is not very encouraging to them to find that certain large works are not doing all they might do with their greater facilities in output, plant, and staff. The Bristol Gas-Works are instanced; and a correspondent says that, according to his information, toluol is only being extracted there at one out of three works. We hope he has been misinformed, or, if accurate, that there is an explanation. We shall, however, be glad to hear from the Company, and to publish a statement to the effect that a mistake has been made, or that the process is now being applied to a larger extent. The "statement" being in circulation, should "mis" be prefixed to the word, it will be an advantage to have it corrected. The correspondent adds that the exercise by the Bristol Company of their full capacity for producing toluol would equal the possible production of a very large number of small works. But because a large concern is not working up to its full capacity is no reason why the small undertakings, with plant available, should not be doing their little part. It only makes things so much worse if they are not doing it; and, be it remembered, we have high authority for stating that every drop of toluol procurable is wanted. This being the case, those who can contribute more, but will not put themselves out a little to do so, are doing something to serve the enemy. That is the plain truth.

In view of the imperative need of the country, any little additional trouble that may arise must be regarded as a subsidiary matter. There has been with the advent of colder weather, difficulty somewhat above the normal with naphthalene in various areas; but this must not be allowed to be a deterrent to the realization of the fullest possible supply of toluol. The "C" process reduces the number of grains of naphthalene per 100 cubic feet of gas; but this reduction notwithstanding, with the colder weather, there is the extra difficulty, probably owing to the larger percentage of light oils extracted from the gas by the process, leaving insufficient to hold the naphthalene in suspension. In the article on the "Market Value of Light Oils and Other "Constituents of Tar" that appeared in the "JOURNAL" for July 20, it was shown that the benzol, toluene, solvent naphtha, and heavy naphtha in a sample of crude tar from Durham coal totalled 3·4 gallons per 100 gallons, while in a sample of "treated" tar from Durham coal the same constituents amounted to 9·4 gallons per 100 gallons. There is sufficient explanation here to account for an accentuation just now of the naphthalene trouble. However, experiences vary among engineers working the process at normal temperature; for some assert that they have not yet experienced what others say they are experiencing acutely, or in rather more than usual degree at this time of the year. However, it seems that, in some instances, there is likely to be a return temporarily to one or other of the processes that were applied, to obtain relief from naphthalene trouble, before heavy charges in horizontal retort and vertical retort working produced some reduction, and so lessened the necessity for the application of these processes. The main thing is that toluol is a vital national essential to-day, and as long as the war lasts.

A Strong Backing.

OF special interest and opportuneness are two aspects of the short address that Bailie Paxton, of Glasgow, delivered as President of the British Commercial Gas Association last Tuesday. The one was not verbally presented—the other was; and it supplies a tersely put, but irrefragable, case for financial support, on the full regulation scale, being given to the organization. But first concerning the aspect of the address that has no direct expression. The mouthpieces of the gas industry in connection with its work have been for the most part its executive officers; and practically all the executive officers—those upon whom fall, in large measure, the responsibility for business development and dividend and interest earning—are men who do not need conversion to the aims, objects, and methods of the Association. The

administrators of gas undertakings, who hold the purse-strings, are fully cognizant of this; and we fancy that some of them rather incline to the view that members of the gas profession in this matter of co-operative effort simply run together like a flock of sheep. Those who may entertain this view have little real understanding of all that co-operative publicity and educative propaganda mean to the gas industry. But here we have Bailie Paxton—typical of all that is strong in the commercial world, and one who for many years was at the head of the Gas Committee of the Glasgow Corporation. He is not a gas engineer or manager; he is purely a virile man of business, and does not claim to be anything else. This being so, his views should appeal strongly to other gas administrators; and his views regarding the work of the British Commercial Gas Association are crystallized in the words—it is indispensable. Things that are indispensable forge ahead in acceptance without requiring much motive force behind. With him, as other gas administrators will see, the indispensableness amounts to a deeply rooted conviction; and so great is his faith, that he is satisfied that not many years will pass before the (under) 20 per cent. by volume of gas sales unrepresented in the Association will be added to the present (rather above) 80 per cent. that subscribe to the work of the Association, and the expenditure be looked upon as being as necessay as that for coal or wages.

Bailie Paxton, as a business man and gas administrator, does not stand alone in his views on this subject. In his address—and this is the expressed aspect—he presents such a phalanx of considered opinion backing his views that those gas administrators who do not appreciate the value of the work of the Association, or prefer that others should pay for it although enjoying the increased stability it is giving to their interests, would, if they were disposed to try, find it an impossibility to break through that phalanx. When the gas administrators of London, Edinburgh, Cardiff, Dublin, Glasgow, Manchester, Salford, Birmingham, Liverpool, Belfast, Newcastle, Bradford, Leeds, Sheffield, Hull, Derby, Leicester, Norwich, Portsmouth, and Plymouth give their support, with those of many other substantial gas supply concerns (not forgetting the Society of British Gas Industries), to the work of the Association—knowing it to be good—what can those outstanding say in any attempt to show that they are right in declining to support the co operative work, and that the administrators of the imposing concerns mentioned are all wrong in doing so? It would be a very real pleasure to discuss the matter with those who believe that all the administrators of those gas undertakings have gone astray in this regard.

Up to now, says Bailie Paxton, nearly £100,000 has been subscribed and spent upon co-operative publicity work for the gas industry; and every undertaking in the country—subscribing and non-subscribing—has benefited from it. It is no use simply to deny this; it is no use postulating that even traces of it are not to be found in the balance-sheet. This depends upon the amount of acumen brought to bear on the examination of the conditions and of the balance-sheet. Before the Association came into being, what was being done beyond ordinary local effort to develop the gas business? Nothing. But since, the Association has exercised a potential educative influence in many quarters where the individual gas undertaking could not have entered and operated; and the gas industry is feeling the effect of the influence. We are sensible everywhere we go, and day by day the feeling is being strengthened, that ill-conceived prejudices and misapprehensions have been, and are still being, removed; and that gas, and all that the industry is in and to the work and convenience of the nation, are better appreciated than ever before. This change, which is growing, is not due to the disjointed policy preceding the advent of the Association. It is due to well-defined effort and set purpose; and it is a certainty that the position of gas supply and application would not be altogether what it is to-day had it not been for the work of the organization. The work is a gain; it has reinforced the position of the gas industry. A bomb fell the other night on a reinforced concrete roof in London. The roof withstood the shock. A bomb the same night fell on to a wood-paved thoroughfare with a concrete foundation. The concrete foundation at the spot was pulverized. The gas industry has a strong, cleverly directed competitor. The British Commercial Gas Association has added, through its reinforcing work, to the power of resistance of the gas industry, and to its capacity for making progress. We ask the outstanding undertakings—large and small and the intervening ones—to think over the matter in this light; to think of the position before the advent of the Association, to think of the position as it is now, and ask whether the stability of the industry would be what it is, and its future so solidly assured, without the unflagging work of the Association. Those—if any there be—who say they would have been, must be blind to the most patent facts.

The Juniors Start a New Session.

The Junior Associations have commenced their session's work in Scotland and in London; the Midland juniors will be meeting next month; we have yet to learn what the Yorkshire Association are proposing to do; but the Manchester Association have, for sufficient reasons, decided to abandon their meetings this winter. There can be argument both ways as to whether continuance or discontinuance of the meetings is, under current circumstances, the proper course. There is so much to be done for the local community and the country generally inside and outside gas-works by men of military age (and most members of junior organizations are so), and there has been such a considerable drain upon the staff and rank-and-file of almost every gas undertaking, that there cannot be much remnant time to be devoted to meetings away from home. At the same time, there is sympathy with the view, as expressed by the President of the Western District of the Scottish Junior Gas Association last Saturday (Mr. David Fulton, now Engineer and Manager at Helensburgh), that "those members whose "path of duty lay at home would be glad of an opportunity "of occasionally meeting in the usual way. Therefore, a "somewhat restricted session was arranged." There is little question that for some gas undertakings the coming winter will be weighted with considerable difficulty in respect of both raw material and the maximum demand for labour. But, if the former, it will be largely the fault of the administrations; for most works have lately been in the position to secure good stocks—and they will want them before the winter months are left behind. Naturally, during times of stress and difficulty, there is advantage in men of the same calling getting together to talk over affairs, for experiences often lead to mutual relief and other benefit. The argument is therefore about equally balanced in favour of meetings or otherwise this next winter. Of course, the same arguments apply to the senior organizations.

In last week's issue some extracts were published from the address of the President of the Eastern District of the Scottish Juniors (Mr. J. J. Scott); and this week there are addresses by Mr. S. B. Chandler, President of the London and Southern District, and by Mr. Fulton, already alluded to. All three Presidents speak in unison of the value of the Junior organizations to themselves and to the industry. We do not know of any movement in the industry that has done so much as these junior organizations to put the juniors on their mettle, to promote among them perseverance in inquiry, to discipline their minds in regard to technical matters, and to bring into the light of day the best there is in them. They provide fertile grounds in opportunity and incentive; and when Mr. Fulton remarks, "Whatever "slight success I have achieved has been in no small "measure due to the educative and inspiring influence of "this Association," he is only saying what he and scores of other young men of that and other junior organizations know to be true. Every year brings its fresh proof of value; and every year adds to our pleasure over the part we took—subsequent to the establishing of the Manchester Association—in stimulating the organization of the juniors. The Associations have done much to fit the juniors for work in higher spheres.

But there is still a feeling among the juniors that all possible is not being systematically done that might be done for preparing them for their work in later life. We get this voiced by Mr. Fulton; and it is an echo of the capital feature of the address on "Education in the Gas Industry" that Mr. F. J. Bywater delivered at the Midland Junior meeting in February, 1914. Mr. Bywater spoke, and Mr. Fulton speaks, from personal experience, when deploring that there is non-existent in the gas industry a scheme defining the lines on which the education of the technical juniors should proceed. They are, outside the practical experience within the gas-works, left very much to follow their own devices and inclinations in the matter. As we said at the time Mr. Bywater delivered his address, we are not believers in cast-iron educational formulary for men of diverse intel-

lects, though training for the same profession. But, as Mr. Fulton observes, we have the educational machinery at hand for the technical gas student; and it is a great pity that the best use is not made of this by the preparation by a competent body of something directive for the gas student as to the course of study he should pursue. This is a work that could very well be taken in hand by the Institution of Gas Engineers in collaboration with the Universities, colleges of science, and technical schools at which there are departments specially devoted to lines of scientific study that bear fundamentally upon the engineering work and processes of the gas industry. When from those who have been closely identified with the junior organizations, and have passed to senior estate, there comes an appeal of this character, it ought not to be placed on one side—and forgotten.

Commercial Position and Essentials.

The address (mentioned in the preceding article) that Mr. Chandler delivered at the meeting of the London Juniors on Friday was full of good things, taking, as it did, a sweeping glance over the commercial position of the industry in relation to gas sales and applications, and in competition with the electrical industry. The position is good, provided maintenance is properly and liberally studied, and provided that the gas-fitters employed are raised to a proper state of efficiency for their work. Mr. Chandler points out, among much else, how the present war has accentuated the large and influential capacity for work of the gas industry in divers directions, in comparison with which the capacity of the electrical industry has a restricted actuality. There is hardly anything—in fact, we do not know of anything—that can properly be called war material in the production of which the gas industry has not had part, or for which (and these vital necessaries) it has not assisted in the provision of the basic ingredients. The position is one of which the industry is pardonably proud. In some respects its ability to be of such vast use to the nation in these times is due to the scientific handling of the coal it uses, compared with the very unscientific methods employed at the very root of electricity generation. Mr. Chandler calls attention to the value obtained per ton of coal carbonized by the gas industry and to the enormous waste that proceeds hour by hour in the electric industry through the charging of raw coal instead of coke under its steam-raising plant. Supplementing what he said, the two processes may be examined upon thermal results alone. Before the war certain electricity stations were paying an average of 15s. 9d. per ton of coal delivered; and the fuel accounts worked out to 0·44d. per unit of electricity generated. This meant 429 units per ton of coal, which, at 3420 B.Th.U. per unit, would develop a total of 1,467,180 B.Th.U. Take a production of only 12,000 cubic feet of gas per ton of coal, and 520 B.Th.U. per cubic foot, this means 6,240,000 B.Th.U. Take roundly 10 cwt. of coke per ton of coal carbonized, and 13,500 B.Th.U. per lb., the 10 cwt. of coke would develop 15,120,000 B.Th.U. Thus gas and coke alone (without reckoning the tar and pitch) from a ton of coal give us on a low estimate 21,360,000 B.Th.U., as against 1,467,180 B.Th.U. by the electricity generated from a ton of coal, under the conditions mentioned. Thermally, and in the destruction of valuable products, the electrical process is terribly wasteful. It is a matter of which Professor W. A. Bone and the newly formed British Association Committee on Fuel Economy should make note.

With all that Mr. Chandler had to say respecting modern gas appliances, and the excellent position in which their efficiency places the gas industry, we are in full accord. The same with respect to his remarks on the education of gas-fitters, and the necessity for gas salesmen being well acquainted with the principal competitor and with electric appliances. There is one small point for criticism. We want to put as favourable a view upon our position as is justified, but not more so. Mr. Chandler says it is not easy to imagine the time when electricity can ever successfully compete with gas for certain purposes, especially when one considers that, in respect of thermal units generated, about 7 cubic feet of average town gas are the equivalent of the expenditure of a Board of Trade unit. From this, he remarks, it appears that current must be supplied at something like ¼d. per unit to compete with gas in point of cost alone. It is not exactly so. Mr. Chandler takes no account of the respective efficiencies of the appliances. He obviously assumes that the B.Th.U. of the 7 cubic feet of gas and the unit of electricity are all going to be converted into useful work, which they will not be. The proportion of B.Th.U. so converted depends upon the efficiency of the appliances used for different purposes; and efficiency affects cost.

In the matter of the practical training of members of the outdoor staff, the suggestion appeals to us as an excellent one that on every works a permanent exhibition should be established (open to employees only), in which a sample of every piece of apparatus adopted for sale or hire should be placed; and periodically the parts, operation, and capabilities of the appliances should be explained to the staff and the men by a competent official. This would be educative, and therefore valuable in realizing a progressive efficiency. And nothing should be left undone to attain this in the highest possible degree. Taking a perspective view of conditions, it is safe to say that competition will become more active and more severe with passing time; and therefore the industry must betimes organize and develop its resources to the finest attainable pitch. It has good appliances; it dispenses in the majority of places cheap B.Th.U. The position must not be spoilt by the inferior work and knowledge of indifferent men. Mr. Chandler has very broad views on the essentials; and those who adopt and practise the lines laid down in the address will be those who will give a good account of themselves in the gas-trading work of the industry.

Coal Supplies and the Winter.

Many gas undertakings have protected themselves and their patrons by putting into stock for the coming winter an unusually large quantity of coal. They have been wise; for exactly what is going to happen in connection with both coal output and transport during the next few months is as nebulous as anything can be. Recruiting still proceeds in the mining areas and among railway staffs; and it is considered that, unless a stop is put to this, the two services will be grievously imperilled. There is also the insecurity of sea transport, and the shortening of the hours of running during a day. On the whole, it is clear the next few months will be full of uncertainties. In their market report last week, the "Iron and Coal Trades Review" said that "the output of coal at the present time is certainly not equal to the home and foreign demand." If this is so, then it should mean a further curtailing of the quantity allowed to be exported. In the House of Commons last July, Mr. Russell Rea, the Chairman of the Coal Exports (Regulation) Committee, stated that the principle guiding the Committee is "the Englishman first, the foreigner second," with, of course, special consideration for our Allies. The work of the Committee therefore is to see not that the output is equal to demand at home and abroad, but that there is primarily satisfaction of home requirements.

A German Gas-Works Report.

Unusual interest attaches to the report for 1914 of the German Continental Gas Company, of Dessau, because, of course, it covers several months during which the countries in which the operations are conducted were at war; and, moreover, it offers some few remarks with reference to the progress of affairs within so much of the present year as has already elapsed. The issue of the accounts is somewhat belated; but those who are familiar with the operations carried on by the Company will understand, as is pointed out in the report, that there has been delay owing to the difficulty of obtaining early information of the position of the Company's undertakings in hostile countries. Now that the figures are available, they show a falling off in the total output of gas from the different works of less than 1 per cent.; and this reduction, it is stated, is entirely due to the altered condition of affairs prevailing in the period which succeeded the fateful first days of August. This early adverse effect, it seems, subsequently vanished, for the scarcity of petroleum as a result of the war was responsible for the bringing in of many new gas consumers; and there would have been more but for the lack of labour, which interfered with the making of connections. One of the Company's stations with regard to which direct information was wanting at the time of the report was Odessa; but the past months have at any rate been less eventful there than has been the case at Warsaw, which works were sequestrated at the end of the year by order of the Russian military authorities—only to be restored by the German Government during the latter half of August,

Whatever may have been the effect of the change of ownership on the gas manufacturing operations, the works themselves were in good condition when the Company recovered control of them. That the position of the electrical industry in Germany is not a happy one is confirmed by the statement in the report that the embargo placed on copper has hindered the further extension of the Company's electrical undertakings.

Jealousy and a "Phenomenal" Demand.

The little exhibition lately held at the Hygienic Institute in Devonshire Street (off the famous Harley Street) has excited the envy of "Electrical Industries;" and it has been pouring out green jealousy by the column. It praises the thorough work that is being done by the British Commercial Gas Association, and wants to know how long the electrical industry is going to let the gas industry have all its own way in the matter of co-operative propaganda. But for the rest, envy, malice, and all uncharitableness The Sales Manager of the Marylebone Electricity Department (Mr. H. H. Holmes), of whom we have not heard for some time, appears to have regarded the torrential outburst of our contemporary as reflecting upon the enterprise of his department. Mr. Holmes is mournful. The financial conditions of the formerly boastful Marylebone Electricity Department are not such as to promote joyful feelings. "We could not help ourselves" is the burden of his song. In current circumstances, the Council will not do anything fresh in the way of advertising. There has been such a drop in revenue that there is no money to spare for advertising. The reserve fund has already been greatly depleted. Had conditions permitted a display at the Hygienic Institute, it would have been inadvisable; for, without advertising, the demand for electric cooking and heating apparatus in the Marylebone area is "phenomenal." We should like to see the word "phenomenal" translated into numbers and types of apparatus. Things are so bad, indeed, financially that it is quite possible the department will have to cease the hiring of apparatus, seeing that they have nothing in the locker, and loans for electrical apparatus are something that cannot be contemplated, as being for the purpose of pandering to the desire of the idle rich for novelty, and of supplying installations to those whose enthusiasm or interest surpasses discretion and need for economy in money and time.

The State of Employment.

The prevalence of a condition of affairs which has for some time past been manifest to employers, is demonstrated by official figures with regard to the state of employment at the beginning of this month. From these it appears that in the trades compulsorily insured against unemployment, the percentage of those not in work on the 1st inst. was only 0·91. This is a slight further decrease on the figure of a month earlier, and compares with 5·11 per cent. at the same date in 1914, and 3·45 per cent. two years ago. That is to say, over the whole of the United Kingdom the rate of unemployment in the insured trades is less than one-fifth of what it was a year ago, and under one-third of the rate in 1913. With reference to the various uninsured trades, the number of men and women on the registers of the Labour Exchanges on the 1st inst. shows some increase on the figure of a month ago—the exact total being 64,226, compared with 61,767. For the larger aggregate this month, however, female labour is entirely responsible; the figure in the case of men having remained practically stationary—at 16,962, against 16,950. From this it will be seen that, among the uninsured trades, the number of women on the Labour Exchange registers was at the beginning of this month nearly three times as large as that of the men.

Factory Lighting and Night Work.

We have lately had before us the first report of the Departmental Committee on the Lighting of Factories and Workshops, and have discussed some of the information and conclusions contained in it. The report supplies the case for good lighting in places where manufactures are carried on being of considerable economic advantage. Good artificial lighting means, apart from protection from accident, greater output and better quality. This being so, the report is very opportune, as there has been no time in modern history when the maximum output of the best quality has been required from many of the factories and workshops of the United Kingdom—that is to say, from those engaged in an way in providing material for the war. Numerous factories are now working far into the night; some are working all night. In the case of the latter, at the present time at least thirteen hours artificial illumination daily are required, and more than this as the shorter days and longer nights come along. It is imperative, therefore, in the interests of the country, that the artificial lighting of factories and workshops shall be brought up to the highest requisite standard; and in this work the outdoor departments of gas undertakings should try to make their influence felt. It is a work that will have beneficial result for the manufacturer, the country, and the gas undertaking. With such a distribution of effect, there can be no charge of purely selfish motives on the part of gas undertakings in moving in the matter, especially armed as they are now with the report of the Departmental Committee There is another matter in which advice can well be given to factory owners. Factories, as a whole, have large side, and in some cases top, window areas; more artificial light is required at night time; and orders for the subduing of external illumination from internal light sources, so as not to assist night air raiders, have come along. The conditions and the orders are hostile. But the orders must be obeyed; and at the same time production must be maintained at the maximum by the aid of good lighting. The subduing must be effected by methods that do not interfere with the natural lighting; and so the sales departments of gas undertakings should, in addition to providing a good supply of artificial light, make a point of studying the best means of modifying the emission from factory windows of light after dusk. The two things go together.

Canadian Calorific Standard.

The gas men of Canada are well satisfied with the universal calorific standard which has superseded the illuminating power one throughout the Dominion. This places Canada in a leading position in regard to a change which the new circumstances of the gas industry mark as sensible. The conditions in connection with the new standard were set forth in our issue for Sept. 7, on which occasion, in editorial comment, we had nothing but congratulation to express, save a criticism or two in respect of details The matter was referred to in the report of the Executive Committee and in the address of the President (Mr. H. E. Mann, of Montreal), at the annual convention of the Canadian Association last month. It transpires that the new gas-testing regulations were framed by the chief officials of the Inland Revenue Department, in collaboration with the Executive Committee of the Association, which was the correct mode of procedure to arrive at a satisfactory result. The Executive Committee look upon the success that has attended the work as being highly important to the industry; and the President said "the perpetuation of the candle-power standard was detrimental to the advancement of our industry." If the gas men of this country would take the same broad view, and could only get the Board of Trade to see things in the same light as the Canadian Government Department concerned in the matter, we should soon have a catholic calorific standard for gas supply in the Mother Country. Our legislators agree that calorific power is the proper standard. They even now counsel it when promoters of Bills are in Parliament. They would save themselves and the gas industry a lot of trouble if they would only do the same as has been done in Canada, in putting universality upon the new standard. There the new standard of 520 B.Th.U. (total heat test) is to apply to all manufactured gas—whether from British Columbian coal in the west, from Nova Scotia coal in the east, or from Pennsylvania coal in Central Canada. Water-gas manufactured from coal or coke and oil is to similarly conform. If the new standard proves irksome to any undertaking by reason of geographical location or quality of raw materials available, the Executive Committee of the Association ask that the matter be reported to them.

Patents and the Defence of the Realm.

Inventors in certain branches which are sure to be appealing to many creative minds at the present time will do well to take note of a recent Order in Council which confers additional powers, under the Defence of the Realm Act, on the Comptroller-General of Patents; though it is clearly stipulated that, before exercising any of these powers, the Comptroller-General shall consult with the Admiralty and Army Council, upon whose request only shall he act. The object of the Order is, first, to enable the Comptroller

to delay proceedings in connection with any patent applied for in the United Kingdom the publication of which it may be determined might be detrimental to the public safety, or might in any way assist the enemy or endanger the successful prosecution of the war. To this end, he may prohibit the publication or communication in any way of the invention, or application being made for the protection of the invention in enemy, neutral, or allied countries, or any of His Majesty's Dominions. In the second place, a month's notice [together with a provisional specification describing the nature of the invention] must be given to the Comptroller of the intention to apply for the grant of a patent in a foreign country or in any of His Majesty's Dominions; and if during the month the Comptroller is satisfied that the publication of the invention might be detrimental to this country in the ways already mentioned, he may make a similar order as in the case of patents applied for in the United Kingdom.

OBITUARY.

Mr. GEORGE T. EGGLESTONE, who died at Wolsingham last Sunday week, aged 64 years, was for a long period connected with the Consett area of the Weardale and Consett Water Company.

The Assistant-Secretary of the Tynemouth Gas Company, Mr. ROBERT HARRISON, died last Sunday week, after a paralytic seizure, at his residence at North Shields. Deceased, who was 69 years of age, entered the service of the Tynemouth Gas Company, in the clerical department, 43 years since; having before that been in the service of the North-Eastern Railway Company at Tynemouth Station.

Last Wednesday the funeral took place at Bradford of Mr. JAMES KAY, who died the previous Saturday, in his seventy-sixth year. Mr. Kay for ten years—from 1888 to 1898—represented West Bowling on the Corporation, when the great question under discussion was that of the Nidd Valley water scheme; and Mr. Kay associated himself with the late Alderman Holdsworth and others in pressing for the gravitation scheme.

Lieutenant TOM V. DANN, the eldest son of Mr. Thomas Dann, Engineer to the Bedford Gas Company, was killed in action in Flanders last Sunday week. Lieut. Dann, who was 29 years old on the 1st inst., joined the 1/6th South Staffords in August, 1914, as a private, and quickly rose to be Company Sergeant-Major. He was offered a Commission on the field, and was gazetted on Aug. 24 last. Mr. Dann's second son has been through the rising in South Africa, and was with General Botha through the South-West Africa campaign. This force is now disbanded.

The death occurred at Buxton last Thursday week of Mr. WILLIAM MORRIS, who was for upwards of fifty years with the Kent Water Company and the Metropolitan Water Board. He was born in Mill Lane, Deptford, nearly eighty years ago, and was the eldest son of Mr. W. R. Morris, who sunk the first artesian well for the Kent Water Company about 1835. Mr. William Morris (who more recently lived at Brockley) served under his father for seventeen years, afterwards becoming Engineer to the Company, and later District Engineer for the Water Board. In 1907, when he had completed fifty years of service, he was presented with a fruit, sweet, and flower stand, in commemoration of the event, and in token of the regard and esteem in which he was held by the staff. He retired some six years ago, with the best wishes of all with whom he came into contact. Deceased was made a member of the Institution of Civil Engineers in 1877, and was also a Fellow of the Geological Society.

Imperial Continental Gas Association.—The Secretary (Mr. R. W. Wilson) notifies that, at a Board meeting held last Wednesday, the Right Hon. Lord Gorell was unanimously elected a Director of the Association, to fill the vacancy on the Board caused by the death of the Hon. Sir E. Chandos Leigh, K.C.B., K.C.

The Late Mr. Lyon.—Mr. John George Lyon, F.I.C., F.C.S., J.P., head of the firm of Stainsby and Lyon, Limited, chemical manufacturers, of Knottingley, Yorkshire, who died on Aug. 27, aged seventy-three, left estate of the gross value of £244,263, of which the net personalty has been sworn at £236,904.

Acetylene Gas Generation.—An acetylene gas generating apparatus, in which the gas is claimed to be made non-explosive by mixing it with oil gas—the two gases being produced simultaneously—has, according to the "Chemical Trade Journal," been patented in the United States. The gas is intended for welding and cutting metal, but may be used also for mine and other lamps, domestic purposes, &c., as the cost of production is said to be very low. The generating charge is put up in a sealed cartridge, and water is fed to the carbide under control. The cartridge has a central tube, around which are packed layers of carbide, separated by layers of sawdust saturated with crude oil. Sand or other inert material may, however, be used instead of sawdust. When water is admitted to the central tube, it starts the conversion of the bottom layer of carbide, the heat from which vaporizes the oil in the first layer of sawdust, and so on, with the others in turn. The oil vapour serves to absorb any excess of oxygen. The cartridges are made in various sizes.

VIVIAN BYAM LEWES.

WE close our journalistic week with sad news. Under tragic circumstances, Professor Vivian B. Lewes, F.I.C., Professor of Chemistry at the Royal Naval College, and Chief Gas Examiner to the Corporation of the City of London, and long-time friend of the gas industry, died on Saturday night, at the residence of Mr. William Buckley, Chairman of the North Wales Munitions Board, at Hafod, near Mold. The end was due to an attack of double pneumonia. He had an engagement at Mold last Tuesday, to deliver a lecture under the auspices of the Educational Trust, on "The Explosives used in the Great War"—a subject on which his connection with the scientific work at the Royal Naval College eminently qualified him to speak. On reaching the railway station at Mold, he was found to be in a state of collapse, and was at once removed to the house of his host, Mr. Buckley. His condition gradually worsened, and Mrs. Lewes was summoned; but, despite all possible effort, the sufferer passed away on Saturday night. Professor Lewes was in his sixty-fourth year.

Thus the end of a prominent personality in the fortunes and work of the gas industry, among the men of which he was so highly popular, and which men without exception entertained for him something akin to affection for (even apart from the fruits of his scientific gifts and distinguished ability) his own manly qualities, and uniformly kindly and charming disposition. We mourn one who was a distinct asset to the industry; one who occupied in it a unique position. It is said that no man is irreplaceable; but if any man ever stood astride this proverbial saying that man was Professor Lewes. There is no one who can at once take his place as a popular lecturer in and for the industry, no one who has the gift of making the dullest of subjects so pleasant as he could make them, no one who has such a broad and ready grasp of facts on all sorts of subjects of inherent importance in the work of the industry or having close alliance with that work, no one who has those facts so available on the tip of his tongue, no one who can so readily fence over them with his adversaries (our friend rarely had any), and there is no one more apt than he was as an investigator of diverse subjects, and capable of promptly reading and appreciating the value of the results. He could take current conditions, and critically examine them for prospective importance. He could look with the deepest seriousness on things, and could see the light side of the same things. In this power were the extremes of a large talent and disposition; and between the extremes lay much else that was distinguished for good and worth. It was a composite ability and character that we had in Professor Lewes, such as is given to few men; and therefore it is that we cannot feel as we contemplate his loss to-day, and the sudden cleavage of a long personal friendship, that he is replaceable.

It was in 1888 that Professor Lewes was first brought prominently before the gas industry, by editorial references in the "JOURNAL" to a lecture that he had delivered to the Royal Institute of British Architects, on "Illumination and Ventilation." At that time—some twenty-seven years ago—Professor Lewes was associated with the Royal Naval College; but we then addressed him as "Mr." His work there in connection with matters of scientific importance to the Navy—such as the chemistry of coal and its combustion, oils, drinking waters, boiler incrustation, corrosion, spontaneous combustion, ventilation, and much else—provided the pathway to work in the gas industry, in which work he felt such large delight and interest, but which work could have produced but inadequate compensation for the enormous amount of time that must have been spent in historical research and personal scientific investigation. When in 1903 the Institution of Gas Engineers paid him a trubute of their high regard by making him an honorary member, he spoke of the great interest with which he had been provided by the ample opportunities afforded by the gas industry's primary and secondary products, and that interest and his association were never even temporarily broken. Some five years after Professor Lewes's (as we put it) prominent introduction to the gas industry—"prominent" because, as will be seen from a reprint below, he was on the border of the industry in minor capacity before—he was a candidate for the position of Gas Examiner to the City of London; and the copy of his letter of application is to-day of interest. It was to the point, it was modest, and it showed that, when speaking of himself, he was on a topic that he could treat with brevity, and not with that breadth that was a feature of some of his lectures. Here is his application (which was dated January, 1892):

To the Lord Mayor, Aldermen, and Common Council of the City of London.

MY LORD AND GENTLEMEN,—

I beg to offer myself as a Candidate for the Post of Gas Examiner to the City of London.

I am Professor of Chemistry at the Royal Naval College and for a very long time have devoted myself to the study of questions connected with Coal Gas and Illumination, having been for several years Principal Assistant to Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner, and subsequently an Assistant Gas Examiner, in the City for upwards of ten years—an appointment which I only resigned last spring.

I have contributed many original papers and researches to the learned Societies; amongst which I may quote papers on "The Analysis of Illuminating Gases" and "The Analysis of the Products of Incomplete Combustion," read before the Society of Chemical Industry last April; "On the Enrichment of Coal Gas by Car-

buretting Materials other than Cannel," read before the Incorporated Gas Institute in July last; and was selected to give a course of Cantor Lectures on "Gaseous Illuminants," delivered at the Society of Arts in the Autumn of 1890.

I am the Author of a book on "Service Chemistry," which is the manual used in the Navy, and also of a text-book on "Inorganic Chemistry," whilst I have a work on "Air and Water," at present in the press.

I was last year the recipient of the only Gold Medal ever given by the Institute of Naval Architects, which was awarded me for a Research on Boiler Deposits, and am at present engaged on extended researches on the Light-Giving Properties of Flame and the Latest Improvements in the Manufacture of Illuminating Gases, which will be published at an early date.

I shall be forty years of age next March, and have been for some years a Liveryman of the Shipwrights' Company.

I am fully conversant with every detail of the Gas Examiner's duties, and, should you honour me by selecting me for the post, I shall do my utmost to prove myself worthy of your confidence.—I am, Gentlemen, your obedient Servant,

VIVIAN B. LEWES.

He obtained the appointment, and held it up to the end. But though he occupied the official position, the Corporation were ever generous in not placing any veto, except where their own interests were concerned, upon Professor Lewes rendering help to the gas industry. The Corporation have lost an excellent adviser; and one who has kept them, in their relations with the gas industry, upon the track of practicability, and has not let them down, as has been the case in some other instances of "scientific" counsel, into utter absurdity.

Speaking of his relations with the City of London reminds of Professor Lewes's work in the parliamentary arena as an expert witness. He was often there—not only in connection with the gas industry, but in association with other affairs, Metropolitan and provincial. He was in all the big fights of the past quarter of a century in which the gas industry has been engaged—especially in the contests in which Sir George Livesey took the lead, which had for their object, and which gained, greater liberties for the industry in the matter of the illuminating power standard, the application of the "Carpenter," or "Metropolitan" No. 2 burner to gas testing, the abrogation of the sulphur compounds clauses; as well as in connection with the water-gas controversy, and the establishing of the calorific value standard, which last-named he long since advocated. In fact, his lecture before the Institution of Gas Engineers, on "Candles and Calories," in 1903, is worth reading to-day in the light of subsequent events. He helped the industry hugely in the Parliamentary Committee rooms, and was soon popular with every Committee before whom he appeared. And the members of the Parliamentary Bar always preferred to be on the side where Lewes would be for them rather than against them. His abilities shone when he was in the witness chair; and the gift of repartee which he possessed in an uncommon degree was a weapon which he skilfully handled to the discomfiture of his opponents. When he was in a case, and when the information passed along that "Lewes was in the chair," the loiterers about the corridors of the Committee rooms were speedily there for interest, and because they knew that Lewes would not have the worst of the forensic encounter.

What need is there to speak of his numerous lectures and papers specially associated with the industry? They are well known; they live in recollection. They were always instructive; and interest in them never flagged. Professor Lewes frequently lectured before the Institution of Gas Engineers on divers subjects; and no one received a greater ovation. Among the members he was popular; and though some of them entertained the view that he committed a little indiscretion (from and during the time he became associated with the ill-fated Coalite Company) in persistently advocating low-temperature carbonization for the gas industry and the abandonment of high temperature, notwithstanding the changed conditions produced by heavy charging and vertical retort working, which undermined many of his arguments, still to them he was the same Lewes, the same friend, the same stalwart example of a fine *bonhomie*. His Cantor and other lectures at the Society of Arts were always a treat; and the cool manner, the merry hit, the capacity for bringing the abstruse to the comprehension of the layman, will, by the future absence of the popular lecturer, cause a void for the audiences in the famous theatre on many a Monday and Wednesday evening. The Professor nearly always dictated his lectures to a typewriter before he delivered them; but never a word read he. He would stand up, and, save for side jests and quips, give running testimony to a remarkable memory by going through his planned lecture *literatim* as dictated. It was a performance that ever caused marvel among his friends. But those lectures as well as the ones delivered before the Institution of Gas Engineers showed the wonderful capacity and area of interests of our lost friend. He was as much at home on the science of modern explosives as he was on the theory of the incandescent gas mantle, the hygienic aspects of gas lighting and gas-fires, fuel, carbonization, acetylene, air gas, oil, and many other subjects.

Professor Lewes was the producer of various text-books—some of them bulky ones, and the labour put into them must have been immense. He was, in fact, a great, quick, and accurate worker; but the essence of the work was all that met the public eye. His principal books are on "Service Chemistry," "Inorganic Chemistry," "Acetylene," "Air and Water," and "Carbonization." There is a passage in the Professor's preface to "Service Chemistry" which always struck us as being peculiarly apt, and as having very wide application. It is this: "Whilst using the title 'Service Chemistry,' I wish it to be clearly understood that there is but one chemistry, and that its technical adaptation to any special subject is merely an amplification of the science in a particular direction, which cannot be properly done without at the same time mastering the general principles of which the technical application merely forms a small branch, and that a knowledge of the chief principles and theories of chemistry is absolutely essential before any useful application of the science is possible." This reference to the standard literature that came from the prolific brain and pen, has inadvertently displaced an acknowledgment of his useful work in connection with the British Commercial Gas Association, and other organizations. We have also before us as we write the well-known figure with characteristic speech and action, as he stood, or paced the platform, before the audiences with which he filled to overflowing the large lecture room at the National Gas Exhibition in the jubilee year of the Institution of Gas Engineers. Our friend also put his hand to invention. Many years ago, he carried out the celebrated experiments at the South Suburban Gas-Works in the passing of blue water gas through coal gas retorts; and it may be that the intermingling which he then proposed, by which to break-down rich coal gas with a lower calorific value gas, and so give gas to the consumers in the form in which it would be of greatest service under the present modes of utilization, will yet come to pass, and will prove that Professor Lewes was merely before his time in this matter, and that he possessed long-range foresight. He was identified with Mr. C. B. Tully in the methane-hydrogen process.

Professor Lewes was married twice—the second time in 1904, to the youngest daughter of Colonel Lewis-Jones, J.P., of Westgate-on-Sea. To the widow, heartfelt sympathy will go forth from the industry in which her husband had countless friends.

Nothing more need be said. About the final resting-place of our friend will cluster the happiest memories of him, of his work, and of his character, all of which memories were unconsciously sown and established by himself among those who were fortunate in being intimates, and among those who had more distant knowledge of him, but yet were attracted by the magnetic influence which he possessed, and which he communicated to them through the channels of his public work.

PERSONAL.

Lieutenant S. P. THORNTON, of the 10th Leicesters [who was a representative of the Richmond Gas Stove and Meter Company, Limited], has just received promotion to Captain.

Mr. HENRY TOBEY, who for the past twenty-five years has been Engineer and Manager to the Filey Water and Gas Works, as also of the Malton Gas Company, has tendered his resignation of the former position.

Mr. HAROLD GALLEWAY, son and formerly a pupil of Mr. W. M. Galleway, the Secretary and Manager of the Whitby Gas-Works, has received a Commission as Second Lieutenant in the Northumbrian Brigade Royal Field Artillery (T.).

The announcement is made in our news columns to-day of the resignation by Mr. W. J. R. BAKER of the position of Gas and Water Engineer to the Mansfield Corporation, to which he was appointed from Malvern, on the death of Mr. Arthur Graham, in July, 1913.

Mr. WILLIAM HIGGS, the Engineer and Secretary of the Basingstoke Gas Company, has been placed on the Commission of the Peace for the County of Hampshire; and he qualified as a J.P. at the Hants Quarter Sessions at Winchester last week. Mr. Higgs's public work in the county and the borough of Basingstoke has been mostly in connection with educational work.

Mr. H. C. DYER has been appointed Carbonizing and General Foreman to the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company. Mr. Dyer served his articles under the late Mr. S. W. Durkin at Southampton, and was for eight years his Junior Assistant and Chemist. Since then he has been Chemist, Works Superintendent, and Assistant-Engineer successively to the Oriental Gas Company at Calcutta.

Councillor J. A. MACDONALD, who is Chairman of the Ilkeston Corporation Gas Committee and the present Mayor of the borough, has consented to remain in the position of Chief Magistrate for another year, having regard to the exceptional circumstances created by the war. This will be his third year of office. To the great gratification of his colleagues, and of the townspeople generally, Councillor T. SMITH, the Chairman of the Mansfield Corporation Gas Committee, has consented to accept the nomination to the Mayoralty for the ensuing year.

The Gas Committee of the Llandudno Urban District Council yesterday week interviewed a number of candidates for the position of Manager of the works, and afterwards decided to recommend the Council to appoint Mr. A. M'GREGOR, of Colne, Lancs. Mr. M'Gregor—whose appointment was confirmed by the Council on Friday—succeeds Mr. Walter Shadbolt, who (as already announced in our pages) has been appointed Gas Engineer at Fleetwood, in succession to his brother. He is the eldest son of Mr. James M'Gregor, the Engineer, Manager, and Secretary of the Mold Gas and Water Company, with whom he gained his early experience. Following this he served his articles with the

Chester United Gas Company under their present Engineer and Manager, Mr. J. C. Belton—being afterwards promoted to the post of Technical Assistant. During the five years he spent at Chester the carbonizing plant was entirely remodelled, and stoking machinery was introduced. He held the post until appointed to Colne (Lancs.) as Assistant Engineer and Manager, under Mr. Fred. Thorpe. He has been at Colne for twelve years.

After occupying with marked success for nearly thirteen years the post of Engineer and Manager of the Hebden Bridge and Mytholmroyd Gas-Works, Mr. E. J. WELLENS is about to take up the position of Works Superintendent at the Grimesthorpe stat on ot the Sheffield United Gas Company. Mr. Wellens commenced his training under Mr. T. Duxbury, of Middleton, in 1890, and at the age of 26 was appointed to Hebden Bridge. At that time the make of gas averaged 80 million cubic feet a year; while to-day it has increased to 106 millions. Since Mr. Wellens took charge of the works, the price of gas had been decreased from 3s. to 2s. per 1000 cubic feet for gas-engine consumption, and from 3s. 3d. to 2s. 9d. for lighting and cooking. Under his supervision, many important improvements have been carried out. The Board have acquired land, upon which a new gasholder and governor-house have been erected. The works have been practically remodelled, and vertical retorts installed. It is estimated that these new works and extensions have involved an outlay by the Board of £26,000. In Hebden Bridge, Mr. Wellens will be greatly missed. At a meeting of the Board last Thursday night, Mr. Wellens' resignation was accepted with regret; hearty wishes being expressed for his future success.

AN EXPOSITION OF CARBONIZATION.*

A USEFUL little review on coal distillation, gasification, and bye-products has been prepared by Mr. J. E. Christopher, of which the subject-matter, for the most part, has previously appeared in articles published in "The Science and Art of Mining." He divides his review into nine chapters, of which the titles, in order, are: Coal Distillation; Manufacture of Coal Gas; Coke Manufacture; Manufacture of Producer Gas; Bye-Products; Tar; Ammonia; Benzol; Bye-Products from Blast-Furnaces.

He deals perhaps rather more thoroughly with the coke-maker's than the gas-manager's outlook on the carbonization of coal; but in all cases he handles his subject in a suggestive and instructive manner. He has compressed into a small compass a reliable description of the practice and principles of gas and coke manufacture; and students may turn to his little book with confidence that they will glean nothing from it which their later studies will rule-out as incorrect.

The only point on which we are inclined to differ from Mr. Christopher is as to the relative values of the products from gas-retorts. He ascribes 67 per cent. of the total value to the gas, which is a percentage that would be obtained only if the coke and other bye-products were rendering quite abnormally low returns. It would almost seem as though he had added to the value of the gas part of the cost of distribution.

In so small a volume it would be impossible to refer fully to minor impurities and bye-products; but Mr. Christopher has not, we think, said enough about cyanogen compounds—probably because they are of less moment in coke-ovens than in gas-works. These are, however, quite minor blemishes in a work which is singularly free from faults.

* "Coal Distillation, Gasification, and Bye-Products." With Forty-One Illustrations and Diagrams. By J. E. Christopher (Wigan Coal and Iron Company, Wigan Technical College, Member of the Society of Chemical Industry, Joint Author of "Modern Cooking Practice"). Published by Thomas Wall and Sons, Limited, of Wigan. 1915.

Gas Companies' Protection Association. — The eighteenth annual meeting of the Association will be held at the Westminster Palace Hotel on Friday next, to receive the report of the proceedings of the Association, the accounts and balance-sheet for the past year, to elect five members to serve on the Committee in place of those retiring, and to transact other general business. The members of the Committee retiring, but offering themselves for re-election, are: Mr. G. Andrews, of Swansea; Mr. G. Clarry, of Cardiff; Mr. R. W. Edwards, of Aldershot; Mr. T. H. Hazell, of Newport (Mon.); and Mr. Douglas H. Helps, of Reading.

Gas and Petrol Engines at the Panama-Pacific Exhibition.— Last week's "Engineer" reported that one of the largest exhibits of internal combustion engines at the Panama-Pacific Exhibition at San Francisco is that of the Standard Gas-Engine Company of San Francisco. The engines are of the vertical marine type, and used for marine purposes as well as on land. They are equipped with overhead valves; the igniter being in the centre of the cylinder head and directly above the piston. The igniter is of the make-and-break or hammer type. The crank case is ordinarily left open at the ends to permit of ready inspection of the main bearings; but it is so made that it can be closed quite tight, to prevent the escape of burned gases into the engine-room, if good ventilation cannot be provided. The engines are built with one, two, and three cylinders, with a power rating from 4 to 140 H.P. These engines have cylinders 13½ inches by 17 inches, and run at 225 revolutions, driving a propeller 5 feet in diameter. The weight is about 12 tons.

STAFF CHANGES AT LIVERPOOL.

CERTAIN changes in the staff of the Liverpool Gas Company have taken place, following the death of Mr. Edward Allen and the provisional appointment of Mr. RALPH E. GIBSON as Engineer.

Mr. ERNEST ASTBURY, the Superintendent of the Linacre works, has now been appointed Assistant-Engineer to the Company—succeeding Mr. Gibson; and Mr. EDWARD ALLEN (son of the late Engineer), their Chief Draughtsman, has been placed in charge of the Linacre works, in succession to Mr. Astbury.

Mr. Astbury was for three years an articled pupil to Mr. B. W. Smith (now at Walsall) at the Smethwick Gas-Works, and subsequently acted as his assistant for one year. He then joined the staff of Messrs. W. J. Jenkins and Co., of Retford, and was for two years engaged on constructional work for the firm. Mr. Astbury then obtained an appointment as Assistant-Engineer to the Smethwick Corporation Gas Depariment under Mr. Vincent Hughes; and, after two years' service in this capacity, he joined the staff of the Liverpool Gas Company—first as Superintendent of the Athol Street and Eccles Street works (for 6½ years), and since 1911 he has held the more responsible position of Superintendent of the Linacre works.

Mr. Edward Allen received his training in the works, shops, and drawing office of the Liverpool Company. He was subsequently appointed Junior Draughtsman and became Chief Draughtsman in 1904. In this capacity he has gained valuable experience in connection with the extensive additions and alterations to the works and plant of the Company carried out during recent years. He has also acted in a temporary capacity as Superintendent of works on more than one occasion. Mr. Allen has been successful as lecturer in gas supply at the Liverpool Technical School.

PHOTOGRAPHIC RECORD OF METER INDICES.

IN the "JOURNAL" for the 7th ult. (p. 494), a note appeared (on the authority of the New York Correspondent of the "Daily Telegraph") as to the meter inspectors of the Consolidated Gas Company employing cameras for taking records of the meter indices throughout their districts; and in the "JOURNAL" for the 14th ult. (p. 571), we gave from the "American Gaslight Journal" particulars of the apparatus said to be used and the operations involved—accompanied by two illustrations. Being wishful to get further information as to how the work was carried on, a letter was sent to the Company's officials. In response to it, Mr. Lewis B. Gawtry, the Vice-President of the Company, under date of the 30th ult., wrote to say that he had read "with interest and surprise" the statement that the meter-readers employed by the Company would in future be taking a photograph of each meter-index to file with the Company's records. Mr. Gawtry continues: "There is absolutely not a word of truth in this report; and the Company have not such a scheme under consideration. Our meter-readers index some 11 million gas-meters and some 3½ million electric meters each year; so it will readily be seen how difficult the taking of these millions of photographs would be, let alone the filing thereof. We may be guilty of many indiscretions, but we are not guilty of this one, as yet." Mr. Gawtry asks us to deny the fact that his Company are making any such arrangement as was indicated.

The October issue of the "American Gas Institute News" quotes the "New York Times" as saying—evidently in regard to some other place than the capital city—that meter-readers will in future be able to photograph meter-indices; and it is believed that "by adopting this method it will ensure an accuracy which it is hardly possible for the hand, eyes, and mind to attain in keeping such records." The readers will, it is said, be equipped with a small camera and a spool of film; the entire outfit being not unlike the ordinary camera. The camera fits over the indicator in the gas-meter; and by pressing a button a flood of electric light is thrown on the dials, and the exposure is made. The entire operation requires only a fraction of a second. A safety device prevents the making of double exposures; so that inexperienced meter-readers will find little difficulty in snapping the photographs. The readings will be made from the negatives by the bill-clerk. Identification of each meter will be made by means of a numbered tag stuck on the side or below the dials, which also will be contained in the photograph. The name of the new photographic meter reading device is said to be the "Factograph."

Sulphate of Ammonia Production in India.—At the last annual meeting of the Mining and Geological Institute of India (according to the "Chemical Trade Journal"), Dr. H. H. Hayden, referring in the course of his presidential address to non-metallic minerals other than coal, said that India was in very much the same condition as it was some eight years ago. A cheap supply of sulphuric acid available for use at the coalfields would be a strong incentive to the utilization of those valuable materials now being wasted in most of the coke-ovens and to their recovery in the form of sulphate of ammonia and tar. It was many years since the East India Railway Company set up their recovery plant at Giridih; and it was rather remarkable that their example had not been more widely followed.

INTERNATIONAL GAS CONGRESS AT SAN FRANCISCO.

By ARTHUR H. ELLIOTT, Ph.D., M.S.

ABOUT 400 gas engineers mustered on Monday, Sept. 28, at the "Native Sons Hall" in San Francisco, and opened one of the best meetings American gas engineers have seen in a number of years. The rooms and conveniences provided by the local organizations have been well thought out and generous.

The annual meetings of the American Gas Institute and the Pacific Coast Gas Association were arranged to occur at the same time as that of the International Gas Congress at San Francisco; and this brought a large attendance of American gas engineers.

The Pacific Coast Gas Association held a short meeting, received a number of reports of Committees, elected officers, and listened to the retiring President's (Mr. E. C. Jones's) address. He gave an account of the new oil-gas process worked out on the Pacific Coast, where gas is made entirely from oil, and with great success. He noted that in 1893 California produced about 470,000 barrels of oil, and in 1914 102,881,907 barrels were produced. Every foot of gas in California is made from oil without the use of coal. President Jones also spoke in glowing terms of the work in the course of gas engineering at the University of California, which has been inaugurated and maintained by the Pacific Coast Gas Association. [The main portions of the address were given in the "JOURNAL" last week, p. 134.—ED. J.G.L.]

Mr. John A. Britton, of the Committee on this matter, also gave a good account of its work, and said that it was raising the standard of gas engineering throughout California. More will be heard from this later.

On Tuesday, the International Gas Congress was opened by the President, Dr. Alex. Humphreys; and Mr. E. C. Jones, on behalf of the Pacific Coast Gas Association, presented him with a handsome silver mounted gavel of California redwood.

Dr. Humphreys then gave his address, and congratulated the members on the large attendance of delegates and the enthusiasm shown at the Congress—and all in spite of the war. His theme was Public Service Commissions and their relation to corporations and consumers. It was received with much applause. [The address appeared in the "JOURNAL" for Oct. 12, p. 89.]

The paper on "The Development of Water-Gas," read by O. B. Evans, was largely historical. Nevertheless, the paper, and the one on "Deep Fuel Combustion as Applied to Water-Gas Manufacture," by Arthur G. Glasgow, were well discussed by Dr. Humphreys, and Messrs. W. C. Morris, Spitzglass, Elliott, John A. Britton, E. C. Jones, Earnshaw, W. A. Wood, and F. Thuman. The discussion was largely along the line of oil decomposition and the influence of ash of fuel on the action of steam and air; also the regulation of the quantity of air and steam admitted to the generator. The call was for a better study of the influence of clinkers. The variation in the quality of oil, too, was touched upon. It was also the consensus of opinion that calorific value was easier to work to than the photometric standard. [These two papers were given in the "JOURNAL" for Sept. 28, p. 705.]

A paper entitled "The Substitution of Heating Value for Candle Power as a Standard for Gas Quality" was read by Mr. R. S. M'Bride, of the United States Bureau of Standards. [See "JOURNAL" for Sept. 28, p. 702.] The discussion was participated in by Messrs. C. O. Bond, E. L. Hall, Vincent, E. C. Jones, Maxon, H. L. Strange, R. A. Carter, jun., and Dr. A. C. Humphreys. The opinion of the meeting seemed to be all in favour of good average and constant quality, together with enough pressure, and higher than the average now used. Good service was said to be better than large dividends.

In closing, Mr. M'Bride said the Bureau of Standards stood for principles not to determine rules. Ideal gas for light, not ideal for heat and power. Locality also determines standards. Must look to conserving the Earth's energy. Don't sacrifice present needs to future friends. Heat units give the best service we now have.

On the afternoon of Tuesday, the American Gas Institute held their annual meeting, and after listening to the retiring President's (Mr. E. C. Jones's) address, the officers were elected.

A number of reports of Committees of the American Gas Institute were then read. The Committee on the Beal Medal for the best paper presented to the Institute last year reported in favour of Mr. F. W. Steere, for his paper on the "Electrical Process of Detarring Gas."

A number of invitations were received from various cities to hold the next annual meeting in them; and the question was left with the incoming officers to decide.

The President (Mr. E. C. Jones), in his address [*ante*, p. 91], noted the large gathering of gas engineers and the great pleasure the people of San Francisco felt in receiving them. He also noted the Collective Gas Exhibit, which received a Grand Prize from the Panama-Pacific International Exposition and a silver loving cup for the best decorated exhibit in the Manufacturers' Exhibit. He also spoke of the good work of the Public Relations Committee of the Institute, and recommended its report to all the members.

The rest of the time of the Institute was devoted to the sessions of the Gas Congress.

On Wednesday, the work of the Gas Congress was divided into two sessions—one a Commercial Symposium, and the other a symposium on Illumination. Both of these meetings were largely attended. [For abstracts of the papers presented, see the "JOURNAL" for Sept. 21 and 28, pp. 653, 713.—ED J.G.L.]

The Commercial Symposium, in separate section, was under the leadership of Mr. C. Willing Hare, of Philadelphia; and the Chairman was Mr. E. C. Jones, of San Francisco. The nine papers were all well discussed by Messrs. E. C. Jones, Harry L. Strange, W. A. Wood, Spitzglass, C. W. Hare, and others. Many points in service and the sale of gas were discussed; and the key note was "Good Service." Much good should come out of this discussion, and the full report of the remarks should be read by all who wish points in gas commerce.

Another section was devoted to the symposium on Illumination, under the leadership of Mr. C. O. Bond, of Philadelphia, with Dr. A. C. Humphreys in the chair. The papers—all good, and seven in number—were discussed by Messrs. W. C. Morris, John A. Britton, Professor Corey, of the University of California, Bond, Tuttle, Dr. A. C. Humphreys, Dr. A. H. Elliott, Vance, and others. The spirit of the discussion was the calling of attention to lighting and the abolition of glare; also in favour of many small side lights in rooms, as against chandeliers. These reports also should be read by all. They contain many points in favour of gas lighting under good pressure, and also upon the hygienic value of gas lighting. For the gas engineer the papers and discussions are very valuable, and reflect great credit to Mr. C. O. Bond, who gathered them for this symposium.

On Thursday, the International Gas Congress held its last regular session, at which Dr. A. C. Humphreys presided, with a large attendance of all the gas engineers. The paper contributed by the Society of Gas Engineering of New York was read by Mr. R. A. Carter, jun., "On Modern Coal-Gas Processes," and was intended as a review of present American practice. It was very full of information, and required study to properly discuss it. Those who discussed it were Messrs. W. C. Morris, C. H. Nettleton, and C. O. Bond; and written communications were promised by others after the Congress adjourned.

The English Symposium was read by Mr. George G. Ramsdell, the Secretary of the Congress, from abstracts prepared by the American Gas Institute. This was entitled "A Review of the present Practice in the Manufacture and Distribution of Gas by British Undertakings," prepared under the direction of the late Mr. Edward Allen, of the Liverpool Gas Company. [Four of the papers contributed were given in the "JOURNAL" for Sept. 28, pp. 699-701.] After reading Mr. Allen's "Introduction" [*ante*, p. 79], a resolution was passed to send a cable message to England, and the following was transmitted: "Greetings from California. By resolution the International Gas Congress thanks Institute for Symposium on Gas Manufacture and Distribution, and wishes to convey to Mrs. Allen our sense of obligation and personal sympathy. We cordially reciprocate the sentiments expressed in the last paragraph Mr. Goodenough's paper."

The discussion of these papers was participated in by Messrs. R. A. Carter, jun., E. C. Jones, Moxon, A. E. Forstall, Gross, Earnshaw, Simmon, Keppelman, H. L. Strange, E. G. Cowdery, Weber, A. C. Humphreys, and C. H. Nettleton. In the course of the remarks, the question of welded pipes came out, and the methods of welding. Opinions differed as to the way of welding; but welding as an improvement in pipe joints was fully endorsed by all. Pressure under distribution was also taken up, and high pressure advocated. Many pressures as high as 100 lbs. per inch were mentioned as being used with success. House governors have proved safe, and were recommended. Regulators with 3½ to 4 inch pressure to consumer appear to be the best. Some use as high as 150 lbs. for distribution.

The social side of the Congress has been a revelation of Californian hospitality. Practically speaking, every expense pertaining to social events has been taken care of by the Pacific Coast Gas Association.

The first social function was a reception and dance at the Palace Hotel to Dr. Alexander C. Humphreys, with a ball and special dancing by Chinese, which proved most graceful and charming. Then the ladies had special trips prepared for them around San Francisco and to Chinatown, which were unique, interesting, and enjoyable. An automobile trip to Golden Gate Park and luncheon at the Cliff House was another pleasant event.

Thursday was "Gas Congress Day" at the Exposition. Special buses were provided, and addresses of welcome by the President of the Exposition, Mr. C. C. Moore, Mr. John A. Britton, Mr. E. C. Jones, and others made everybody happy and in love with San Francisco. Here also three bronze medals were awarded—one to Dr. A. C. Humphreys, as President of the Gas Congress, and two to Mr. E. C. Jones—one as President of the American Gas Institute, the other as President of the Pacific Coast Association.

Another event of Thursday afternoon was the lecture by Mr. W. D'A. Ryan, an illuminating engineer, on "Illumination of the P.P.I.E." This was illustrated with lantern slides prepared and coloured specially for the Gas Congress. It was a beautiful and instructive lecture, and should be heard and seen to be fully appreciated. An organ recital by the Exposition Organist ended a most delightful afternoon.

On Thursday evening, the banquet at the "Inside Inn" was given, and about 550 ladies and gentlemen sat down to a fine dinner, followed by a dance in the California Building.

At the dinner, Mr. John A. Britton, of the Pacific Coast Gas and Electric Company, was toastmaster; and his good humour

was the moving cause of much good fellowship. One event was the receipt of a wireless message from Governor Pinkham, of Hawaii, to Mr. Harry L. Strange, inviting the Institute to meet in Honolulu. This message was so arranged that Dr. and and Mrs. Humphreys, Mr. and Mrs. E. C. Jones, Mr. and Mrs. Cressey, and Dr. A. H. Elliott were all connected on the line of the receiver and heard the signals perfectly over 2300 miles of space. A reply was sent by Dr. Humphreys.

Another interesting feature of the dinner was the presentation to Mrs. E. C. Jones of an ancient Hawaiian calabash (a large bowl), many hundred years old, a gift from the Honolulu Gas Company. It is made of very old wood, and polished and decorated. In the bowl was the Hawaiian greeting "Alcha Oe Nui," which means, "Much love to you."

Mr. E. C. Jones responded for Mrs. Jones, and told Mr. Harry L. Strange to convey to their Hawaiian friends the greeting: "May your troubles be over, And your pleasures increase."

On behalf of the lady visitors present (about forty), Mrs. O. N. Guldlin, of Fort Wayne, Indiana, spoke in terms of high praise for Californian hospitality and the round of pleasure they had experienced in their visit to San Francisco. She was a charming speaker, and her warm words were received with oft-repeated rounds of applause.

The ladies of California, headed by Mrs. E. C. Jones and Mrs. John A. Britton, have done wonders in making the visiting ladies happy and comfortable. Everything has been greatly enjoyed.

The Gas Congress ended its visit to San Francisco in a blaze of glory from the special illuminations and fireworks prepared for Friday night. It is impossible to give in words an impression of the grandeur and beauty of the spectacle. Mr. Ryan went around the grounds with the visitors and explained the methods. A description of this wonderful evening may later on be forthcoming from Mr. Ryan.

Everybody who attended the Gas Congress will never forget it; and it is going to be very hard to match it, let alone any question of doing better.

THE BRITISH COMMERCIAL GAS ASSOCIATION AND THE SOCIETY OF GAS INDUSTRIES.

THOUGHTS AFTER LAST WEDNESDAY'S MEETING AT THE ROYAL SOCIETY OF ARTS.

By R. W. Edwards.

There was evidence at the gathering on the 19th inst. that an overshadowing influence materially reduced the attendance of members; but there were, notwithstanding, signs of a sincere interest being continued in the Association. The President's address amply bore out this—both for its fresh and invigorating tone, and the broad, but nevertheless convincing, review of the operations. He struck home, on more than one occasion, as to the necessity for closer co-operation, with a view to obtaining members representing 100 per cent. of the gas undertakings. That this should be otherwise, now that the Association has so liberally justified its existence, is somewhat of a wonder. The basis of the contributions is so equitable that the smallest undertaking can participate without any strain, and, in like manner, the largest undertaking's support be commensurate with its resources, and of inestimable value to the Association. It is essentially a Co-Operative Society—large and small are alike, whatever may be their geographical position. The statement made by a member, that rarely a paper or periodical can be picked up without finding some reference, direct or indirect, to the manifold uses of gas, shows how scientific and thorough are the management of the funds and the business of the Association.

It would not serve any useful purpose to dilate on this particular point to any great extent; but there is an object in this preface which deserves very serious consideration.

With the British Commercial Gas Association there has been created a bond of union between the gas undertakings and the Society of British Gas Industries. It has undoubtedly led to a better understanding, which one and all desire to be perpetuated; and, at the same time, the benefits arising have been participated in mutually by both sides. This being so, it is not an unreasonable suggestion that there should be some semblance of equity in the basis on which both great partners contribute to the support of the Association.

It was not until the accounts were actually under review at the meeting that the point appealed to the writer this year. In previous years, he has referred to it both in the columns of the "Journal" and in open meeting. Therefore, the allusion that was made on Tuesday was somewhat abrupt and certainly not over-exhaustive; hence the reference now being more amplified.

The report for the year ending Aug. 31, 1915, shows that the total contributions from the Society of British Gas Industries was £1365, as against, for the corresponding period of 1914 (to Sept. 30), £2378. Immediately, the ordinary member was struck with the alarming difference between the Society of Gas Industries' modest contribution of £1365, compared with the total contributions of the gas undertakings of £15,655; and, although it brought out (through Mr. Depree) the explanation that this sum of £1365 had been, since the accounts were made up, increased to £2016, this did not make the comparison at all a favourable one, nor reduce the large margin between the support of the two great partners.

Now the first point that must naturally appeal to all thinking members of the Association is the extent to which the members of the Society of British Gas Industries are contributing individually to this (not very liberal) sum of £2016. The names of the various gas undertakings that are members of the British Commercial Gas Association are published and open to all; and, in addition, the information as to the amounts contributed by each undertaking is accessible to the committees and to every member who may desire it. Thus, not only are members able to appreciate to the full extent the individual membership, but also the amount of their respective individual support.

That this information should be rightly exposed to all cannot for one moment be disputed. On the other hand, it can reasonably and pertinently be suggested that, in like manner, the Society of British Gas Industries should submit for publication both the names of, and the amounts given by, the contributing members of their Society; and then the gas undertakings will be able to thoroughly appreciate to what extent they are receiving co-operation, individually and collectively, from the Society.

That is the first and salient point which, to my mind, is a *sine quâ non* in connection with this great partnership. The next point is one more on the lines of a suggestion. The present basis of contribution by the gas undertakings is that of 2s. 6d. per million cubic feet of gas made, and—as was explained by the Chairman of the Executive Committee—this represents something in the region of 1d. per consumer per annum. Now it does not require a very high standard of mathematics to commute this basis to one applicable to our friends. On the footing just quoted, there is a basis of some 33,000 cubic feet per consumer per annum—in round figures, say 30,000 cubic feet of gas sold per consumer per annum. Adopting the figure of 4d. per 1000 cubic feet sold as the average profit, the result will represent 10s. of profit per consumer per annum. Thus, in simple words, the gas undertakings contribute an equivalent of 2d. in the pound per annum.

If this basis is found equitable, reasonable, and sufficient from the gas undertakings, why is it not so from the members of the Society of British Gas Industries? I seriously suggest that it should be the equivalent basis for our partners to subscribe on in future, and thus avoid the very invidious position they are now placed in, by obtaining equal rights, equal privileges, but only contributing a very paltry sum in comparison with that received from the gas undertakings.

If it should so be that the subscription of £2016 from the Society of British Gas Industries be derived from but few of its members, and not equally from the whole, then it is to be hoped those few will not level-down their contributions to the twopenny basis—to the disadvantage of the "B.C.G.A."—until they have prevailed on their fellow-members to contribute on an equal basis; the net result and object being to more equally compare with the aggregate subscriptions received from the gas undertakings.

I cannot estimate the effect of the twopence in the pound basis, as the total profits of the firms who are members of the Society of British Gas Industries are unknown to me; but my object is rather to do good than harm in the interests of the "B.C.G.A."

It may be rightly assumed that, as a whole, there is a feeling of great friendship—especially strengthened of late years—between the gas undertakings and the gas industries. It has been found that, by a reasonable spirit and a degree of reciprocity, better net results are obtained in the sales of gas. Very well! This being so, let both great partners join hands truly and equally; and the Society of British Gas Industries contribute their full share to the common expenditure.

There is a good deal more which could be said; but the time is scarcely opportune to enter into deep discussion or argumentative details. Having regard, however, to the fact that there has been a strong feeling, unanimously expressed, in favour of carrying-on the Association during these very serious and trying times, caused by the great war now raging, I suggest that what has been said is sufficient to appeal to all, and that the two points that have been made would be respected and complied with.

There was a different feeling, too, in the natural attitude of the gathering. There was an absence of that unfortunate expression, so frequently made use of a year ago, "Business as Usual." No one seriously, with the job that the country has now got on, could possibly, in his sane moments, talk of "Business as Usual." It was a stronger, quieter, but optimistic attitude this year—one pledged to "carry-on." And here, I think, the matter can be safely left in the hands of the Executive Committee, presided over by that great organizer, Mr. F. W. Goodenough.

The President touched on a retrospective incident. He harked-back to the Munich visit, and mentioned a point over which the enemy was somewhat remiss. He did not, however, unfold the whole of the tale, as he probably would have done, had not war since broken out.

There was one notable absence, which many, I am quite sure, noticed—that was the personality of our late member, Mr. Edward Allen, of Liverpool. Always in the forefront in all matters appertaining to the gas industry, he has left a gap which must be open for some time before it can be adequately filled.

And so the meeting drew to a close, shifting the centre of gravity from Glasgow to Birmingham, where we all of us feel will be exercised that generous and unremitting attention which has all through characterized the activities of the highly respected Bailie Paxton.

ELECTRICITY SUPPLY MEMORANDA.

Some crude views exist as to how it is that trading in electricity has made large progress, and simultaneously the gas industry has gone on its way rejoicing, showing ever-fattening sides, despite competition. Thoughtless people have concluded that the electricity industry has built up its substantial (though it is not always paying) business wholly by cutting huge lumps from the business of the gas industry. If this were true, it would be too great a compliment to the gas industry for our electrical friends to digest, seeing that it would mean that the gas industry had shown a mighty vitality if it could compensate for the losses represented by the whole volume of the electricity business, and added to its circumference in the remarkable manner that has been witnessed. Of course, there are other causes for the two industries having made such considerable synchronous advance, and for the gas industry having shown so robust a constitution in dealing with the appropriations from it of the electrical industry, which appropriations are far short of the total volume of the business of the latter. The "Electrical World"—an American publication—has recently published an article on "The Stability of the Central Station Industry"—the writer being Mr. Frederic Nicholas, who is a member of the editorial staff. He labours under no delusions as to the business of the electricity industry having been captured from the gas industry. A very large proportion of it was never in the possession of the gas industry; and the bulk of it is due to general development of population, the world's requirements, enterprise, and all that goes to make up progress. So, too, the gas industry's remarkable growth is due to the same causes, and to new developments of the application of gas and of its secondary products.

The Ground of Development.

Mr. Nicholas points out that during the decade ending with 1912, the cost of construction and equipment of central electric stations in the United States increased by 334·7 per cent., outstanding capitalization by 227·1 per cent., gross income by 254·2 per cent., and output in kilowatt-hours by 375·8 per cent. In the decade ending with 1909 (it is a pity the figures have not coincidence in time), in gas manufacture there was a gain of 61·5 per cent. in capital, and 120·3 per cent. in the value of the products, which is a profitable state of things, inasmuch as it shows that business has gone ahead faster than capital, which means that there has also been advance in economy in manufacture. It must be borne in mind, too, that percentage figures based on the position to which the gas industry had arrived prior to the decade have no comparative value in relation to the progress made by a more modern industry. The bases upon which the percentages are calculated are altogether different. Industries thrive upon each other; and when Mr. Nicholas points to examples of the development of other industries, he shows where the two industries—gas and electricity—have found much of the ground upon which to develop. For instance, the agricultural industry in the States increased in capital during the decade by 62·5 per cent., and in value of products by 44·6 per cent. Slaughtering and meat packing gained 101·5 per cent. in capital, and 73·8 per cent. in the value of products. The lumber industry increased by 57·1 per cent. in capital, and by 50·1 per cent. in value of products. The manufacture of chemicals and allied industries gained 102·8 per cent. in capital, and 109·9 per cent. in value of products. The woollen industry (exclusive of carpets and rugs), increased in capital by 62 per cent., and in value of products by 75·2 per cent. The boot and shoe industry increased by 101·4 per cent. in capital, and by 76·8 per cent. in value of products. The paper and wood pulp industry showed an increase of 144·4 per cent. in capital, and 110·2 per cent. in the value of products. From 1909 to 1912, the capital of the national banks increased by 48·3 per cent.; and bank clearings reported by the leading clearing-house associations increased by 45·2 per cent. The cost of construction and equipment of street and electric railways increased by 112·1 per cent., and the gross income of operating companies by 133·9 per cent. Mr. Nicholas cannot avoid one note of jubilation. "It will be noted," he says, "how greatly the record of central stations surpasses that of any other industry." But he does not give the bases on which the percentages are computed, which prevents us joining in the jubilation. An addition of 1 kilowatt-hour to 100 kilowatt-hours is 1 per cent. increase; an addition of ¾ kilowatt-hour to ¼ kilowatt-hour is an increase of 300 per cent.! However, it is important that an industry such as that of gas supply should keep a close eye on the development of other industries, and to investigate whether in the developments there is scope for its own business expansion, instead of waiting for this to come automatically, with undue delay and irregularity.

Illustration.

Something is also said in the article as to the making of rates for electricity supply. Mr. Nicholas remarks: "The foundation of an adequate level of earnings is rate-making controlled by scientific investigation, and directed with mathematical regard for all of the considerations involved in changes." We should like to see what sort of case could be made out for the rateable value system, as exemplifying a method of charging "controlled by scientific investigation, and directed with mathematical regard for all of the considerations involved." In this country, the future demands a benevolent latitude in respect of the "mathematical regard." Apparently, Mr. Nicholas thinks the same of America; for he observes that "the consideration to be faced now is the important one that some of the conditions which have been controlling in the past may not be found in the future." This is true. With capital dearer, labour dearer, coal and oil dearer, materials generally dearer, and plant and appliances dearer, tariffs will claim a new foundation; for it is certain that, save in some specially well-favoured areas, reduced generating costs through improved machinery are not going to compensate for all the additions to outgoings which have been imposed by the changing conditions in the world.

New Conditions and Tariffs.

In the same American organ, Mr. M. Luckiesh has an article founded on an inquiry he has made into the cause of eye fatigue, the results of which inquiry are far from conclusive—in fact, the investigator confesses as much. Many people, he says, have taken it for granted that eye fatigue is due to the absorption of radiant energy—visible and infra-red—in the eye media. In experimenting upon this matter, Mr. Luckiesh considered it possible to determine experimentally the effect of energy absorption by surrounding an ordinary incandescent electric-lamp with a water-bath, or other solution transparent to visible rays, but practically opaque to infra-red rays, and ascertaining whether or not the eyes are fatigued as much when used under this low energy illumination as under the illumination containing all the original energy unaltered in wave length. What the views of Mr. Luckiesh are after his investigation are indicated by the statement that, "Sunlight, owing to the greater intensities encountered, appears to be probably as effective in producing cataract and eye fatigue as ordinary artificial illuminants, even after allowing for the higher luminous efficiency of the former, and the absorption of energy by the water vapour present in the atmosphere." At the same time, the inquirer does not claim that the data in the article settle the question of the influence of energy absorption in the eye media. Anyone would have been prepared to say the same thing; for the proper quarter in which to look for the real settlement of the question is not by research of this nature, but in the consulting rooms of the ophthalmic surgeons. The testimony that has issued from these quarters is that since high intrinsic brilliancy electric-lights have come into use, and where such lights are employed, eye troubles have greatly increased.

Eye Troubles.

With the approach of winter, the makers of electric "fires" for room-heating are busy advertising their wares, and having them described in the electrical papers. There is something exceedingly artificial looking about these new "fires." But the manufacturers are doing their utmost to make them as near as possible appear like the popular gas-fire of modern form; and they are meeting with some amount of success. They cannot, however, manage closer equality in that paramount essential—high heating efficiency at low cost. The lamp form of radiator is old-fashioned. There are heating elements now—which are the equivalent of the "fuel" or the "radiants" of the gas-fire. One of the manufacturers—the firm producing what are known as the "Quead" fires—state boldly that they have not hesitated to benefit by the years of experience of the authorities in domestic heating in the worlds of gas and coal; and they have adopted radiant heat. We are much obliged to them. They have not only adopted radiant heat, but fireclay as the base for their new elements; and using this, we are told, there is no trouble with the resistance wire when at red heat. The fireclay bars are of D-shape, run horizontally, and deeply grooved from top to bottom; the wires being placed in the indentations. When in use, the wires become incandescent, and the heat is transmitted to the fireclay. We can see these bars of fireclay absorbing a lot of heat, which cannot all be accounted for in a frontal direction as radiant heat. In the "Revo" fires, made by another maker, there is also a bar of fireclay with concave face, on which is run the resistance wire. In this case, the makers prefer the fireclay not to act as a conductor of heat from the wire more than is necessary. Their fireclay bars have smoothly polished surfaces; and space is left between the fireclay and the wire, so that the former is said to be kept "comparatively cool." In the Ferranti fires, the resistance wire is wound on to a grooved spiral porcelain cone. In the Bastian fires, the resistance material is used in combination with quartz; but the makers of Bastian goods do not appear to think much of the knowledge of other makers. They claim that Bastian heaters (so we read in one of our electrical contemporaries) are free from the troubles that arise with many high temperature heaters placed on the market without sufficient knowledge by the makers as to the conditions to be met with in practice. Let other makers of electric-fires bow down before superior knowledge. The makers of the Bastian types say that there must not be the slightest trace of iron in the resistance alloy; otherwise there may be chemical action at high temperatures, and presumably disaster. In the various makes of fires, one or more elements are used, up to (say) six; and where there is more than one element, there is more than one switch, so that there can be fixed heat control. The elements in the different makes are variously rated at from 600 to 1000 watts per hour; so that on cold days when three, four, five, or six times those loadings per element are required, the expense will shoot

Costly "Fires" for Winter.

up at remarkable speed. The makers of the "Quead" goods recommend that "fires" of ample capacity should be installed in all cases, so that a good reserve is available for emergencies. The advice is very necessary; but, oh, the cost in cold weather! The same makers advise that from 1500 to 2000 watts heating capacity should be installed for each 1000 cubic feet of space to be heated. Users of electric fires find that this is not an over-estimate. Still imitating the types of gas-fires, we see that some of the new electric ones are made with cast-iron casings for permanent fixing in present fireplaces; and there are also "dog-grates," and "insets"—after the manner of gas-fires. There are also portable fires; and fires with very flimsy casings, which have not much about them suggesting permanence.

Nominal and Horizontal Candle Power.

The question whether the purchasers of electric-lamps should merely be told the wattage, without an indication of the candle power or efficiency has not yet reached any definite settlement, and never will while there are people who, while admitting the brazen-faced electrical exaggeration of the past as to lamp performance, object to consumers having no information vouchsafed to them which will guide as to the light that a lamp will actually afford them. In Germany (as well as in America) some of the principal electric lamp people, as we have previously stated, are in favour of the wattage rating. One prominent company—the Siemens-Schuckert—advertising in the "Electrotechnische Zeitschrift," put forward their views in favour of wattage rating, but at the same time they still quote the mean spherical candle power. Pointing out that the candle power of both carbon and metallic filament lamps is generally measured in the horizontal direction, they say, since the light emission of these lamps is less in all other directions, the true candle power (mean spherical) is about 20 per cent. below the nominal value. This is a considerable variation from the reputed performances of the lamps. Putting the rating in watts, and giving as well the spherical candle power, the Company in question say this will permit the consumer to calculate for himself the total operating cost of a lamp per hour of lighting on the basis of the established price of 1 kilowatt-hour. The confessions of past deception have come very tardily from the electricians; but now that they are making confession, they are doing so thoroughly. It would ill-become us not to give them credit when credit is due.

The Miners Object.

The official report on fatal electrical accidents in mines during 1914 states that there were only nine (some of them due to current at voltages of only 220 and 300), which is an improvement. There were sixteen reported deaths in 1913. The miners, however, are restless over the matter; and they are fully persuaded that these official returns only touch the fringe of the matter, and that certain of the terrible colliery disasters, involving an appalling sacrifice of life, have been electrically produced. At the recent Miners' Federation conference, a resolution was passed in favour of securing by legislation, the abolition of all electrically coal-driven machinery in mines; the miners believing that this would relieve them of a serious menace. It was thought that the suggestion being limited to coal-cutting machinery did not go far enough; and so, in remitting the resolution to the Executive Committee, power was given to them to widen its scope. There are indications that this has become a very acute question between owners and men. Example was provided at the meeting a short time since of the Midland Institute of Mining Engineers. The subject under discussion was compressed air machinery; and it transpired that in some instances compressed air has superseded electricity in mines—not on account of greater economy, but apparently to quieten the men. Economy is not the important consideration where there is any question of risk to life.

CONTINUOUS METER-READING.

THE October issue of the "Monthly Bulletin of the National Commercial Gas Association of America" contains an article, under the above title, by Mr. R. C. JAMES, a member of the Accounting Committee of the Association, in which he explains that the system known as "Continuous Meter-Reading"—so called by reason of the fact that a portion of the meters are read each day throughout the month—has been used by many of the larger gas companies for some time, and is worthy of the consideration of smaller companies.

The object of continuous meter-reading is the elimination of the peak-load condition in the work of a company's employees at a certain period of the month. The plan consists in reading a portion of the consumers' meters each day, taking the entire city in rotation, thereby keeping the meter-readers continuously at work reading meters, and the office force continuously at work in putting the readings through the office records and in billing.

The congestion which occurs every month where the meters are read in as few days as possible towards the end of the month is apparent, not only in the office, where the work is put through the records at forced pressure, but in the unsatisfactory service afforded the consumers towards the close of the discount period. When there is but one discount period, increased work is thrown on the distribution department by reason of consumers waiting until they visit the office to pay their bills before turning in complaints and orders. These conditions are offset by continuous meter-readings, as all transactions between the company and its consumers, beginning with the reading of the meters to the collection of accounts, are distributed evenly over the month.

Among the various ways in which the system is helpful to a company, the following are mentioned. The number of meter-readers may be reduced. By being engaged upon meter-reading altogether, the men become expert; and their capacity for reading a larger number of meters soon increases. There is greater accuracy in reading, thereby reducing the number of complaints about incorrect bills. It eliminates the possible necessity of drawing upon the distribution department several days each month for men to assist in meter-reading; and by permitting these men to be profitably engaged in executing orders, it promotes the efficiency of the company's service to consumers.

With some companies, not only will it effect a saving in the cost of meter-reading, because of the fewer number of meter-readers, but an additional reduction may result by reason of the fact that distribution or other men called on to assist in meter-reading are sometimes paid a higher rate than regular meter-readers.

The office and accounting force are enabled to work steadily throughout the entire month in billing consumers and receiving money. The accounting force, being relieved of the forced pressure of getting their work through in the shortest possible time, find more time to consider the work—particularly consumers' accounts with respect to over and under reads, non-registering meters, &c.—and make fewer errors. The necessity for overtime is also materially lessened.

The public is better cared for in its dealings with the company. The congestion, when only one discount period is in effect, taxes the facilities of a company to the utmost; but where continuous discount periods are observed throughout the month, congestion is eliminated, and the consumers are served in a much more satisfactory manner. By having several discount days, consumers are spared the annoyance of having to stand in lines; and by reason of such complaints as are made being heard by a fewer number, the idea of a complaint is not so apt to communicate itself to other consumers.

It spreads the work of the distribution department over a wider period, enabling them to attend more promptly to complaints which develop when consumers are at the office paying bills.

It allows the company to get in its collections much sooner, as the money is coming in continuously during the month, and permits the early use of the money. Collections can be kept up to a closer point, as bills are usually considered delinquent if not paid by the last discount day; and as the discount days would occur several times during the month, the necessary steps for getting after delinquents could be more promptly disposed of, and be given greater consideration.

After thus referring to the advantages of the system, the author said it would be well to consider the steps necessary in making the change to continuous reading. A company reading its meters as near the last day of the month as possible, and desiring to change over to continuous meter-reading, would find it advantageous to have the territory divided into districts, allotting to each district the number of meter-readers necessary to read the meters in that district. The number of meters for each district may vary, due to the density of population or building conditions—such as apartment houses and similar buildings, where meters may be arranged in batteries.

In rendering bills to consumers where a discount is in effect, and the city has been divided into districts, the discount days for the districts can be arranged to fall on different dates during the month—such as the 10th, 15th, 20th, and so on; or where bills are rendered continuously during the month, provision may be made (on the bill) to the effect that the discount will be allowed for ten days after the date of its presentation, or that no discount will be allowed after a certain date as specified on the bill—this date to be so considered that ten days shall have elapsed between the time of delivery of the bill and the last discount day.

Attention is particularly drawn to an important fact not to be overlooked when a company now reading its meters at the end of the month contemplates changing to continuous reading—namely, that it will defer indefinitely a certain amount of its revenue. If meters are being read from the 20th to the 25th or later, and then arbitrarily read continuously, it will reduce the revenue for the year anywhere from ten to twelve days, as in the year's statement where continuous readings are started there will be a whole year's operating expenses included, but only about 353 or 355 days' revenue.

Another matter which might be pointed out in connection with the change to continuous reading would be the apparently large amount of gas unaccounted for during certain periods. Should it be desired to determine the actual "unaccounted-for gas" for comparative purposes, it may be ascertained by determining the average or focal date of statement taking. The foregoing has referred generally to places with a discount period, the author concludes, but will apply equally well to a flat-rate situation.

Illuminating Engineering Society.—The first meeting of the new session will take place at the Society of Arts, on Tuesday, the 23rd prox., when a discussion on the first report of the Departmental Committee on Lighting in Factories and Workshops will be opened by Mr. Leon Gaster.

BRITISH COMMERCIAL GAS ASSOCIATION.

Fourth Annual General Meeting.

LAST Tuesday afternoon, the Fourth Annual General Meeting of the Association was held in the hall of the Royal Society of Arts, John Street, Adelphi, W.C.—under the presidency of Bailie THOMAS PAXTON, J.P., of Glasgow. The same conditions ruling, the proceedings, as last year, were of a brief character; the business being a short address by the President, the consideration of the annual report and accounts, and a proposal that members of the Executive and General Committees (who would otherwise have retired) should remain in office. In spite of all difficulties, many of the members present came from far afield—a fact which demonstrates the keen interest taken in the work of the Association.

NOTES ON THE PROCEEDINGS AT THE ANNUAL MEETING.

Modest in Numbers—Representative in Influence.

THERE were, roughly estimated, some eighty representatives of the gas undertakings and firms subscribing to the British Commercial Gas Association at the meeting, at the Society of Arts, last Tuesday afternoon. The proceedings were almost formal. There was nothing in the nature of conference; the whole object of the gathering being to confirm what had been done during the Association year, and to (so to speak) sanction the continuance of the operation of the organization's machinery in the same healthy and fruitful way as heretofore. But more or less formal though the proceedings were, there were hand shakes with men from across the Border, from the North of England, from the Midlands, from Down South, and from the Eastern Counties and from the Western; so that those present were territorially representative. On the platform were the President (Bailie T. Paxton), the Chairman of the Executive (Mr. F. W. Goodenough), and the Secretary (Mr. W. M. Mason). The Editor of the Association's publications (Mrs. M. A. Cloudesley Brereton) was there. So was the President of the Institution of Gas Engineers (Mr. John Young); and not far from him was the Chairman of the Society of British Gas Industries (Alderman F. Templer Depree). Mentioning Bailie and Alderman, reminds how well municipal and company administration synthetize in this Association—thus demonstrating how common aims unite men. Aldermen were plentiful though the gathering was small. Glancing away from the central figure on the platform, within range of vision were to be seen Alderman William Kay, of Manchester, Alderman F. S. Phillips, of Salford, and Alderman W. Armitage, of Doncaster, and (as said) Alderman Depree. There are strength and influence in these names. It was a matter of sincere regret that Sir Hallewell Rogers, of Birmingham, the successor of Bailie Paxton in the presidency, was unable to attend; but, all being well, we shall see more of him during his year of office.

Presidential Impressions.

An address from the President was the only departure from the business formality of the occasion. It was short; it was a sample which satisfied that, as commercial man and as the late Convener of the Gas Committee of the Second City of the United Kingdom, the President would, had the opportunity been propitious for the reception of the Association in Glasgow, have given an address that would have had a projecting interest in the Conference records of the Association. And in the substance of the address was a dash here and there of the best brand of dry Scotch humour. The members were all sorry that the war and its disturbing influences prevented the holding of the meeting in Glasgow; and the disappointment was equally that of our Glasgow friends. But the British Commercial Gas Association has not yet allowed the word "failure" to be deservedly applied to its proceedings; and there was the fear, generated and warranted by the circumstances of the times, that in point of numbers, if not in enthusiasm for the cause, the meeting would not have been all that would have been desired.

This paragraph is side-headed "Presidential Impressions," which, however, is not quite correct. The impressions were largely formed before Bailie Paxton was elected two years ago to the presidential chair; and they are in reality the cause of his appearance in the presidential chair. He and his colleagues were persuaded as to the value of the work of the Association (and so, we know, was Mr. Alex. Wilson, the Gas Engineer and Manager to the Corporation); and they were also satisfied with the conduct of the Association's affairs. Had they not been so, "they would not have become, as they are, regular subscribers on the full basis—a good test of any man's faith, and not least perhaps of a Scotsman's." Whereat there was laughter; for if liberality ever had good exemplification, Glasgow can, without fear of dispute, claim to have given it. From satisfaction, the belief in the organization has become deeply rooted. The President was glad of the opportunity to pay tribute to the united good work of the Executive Chairman, the Editor, the Secretary, the Advertising Agent, and the Committees—they all deserved it. Then he readily transferred himself to that ancient subject—the value of co-operation. There are many tests of sanity; but accepting "the capacity to co-operate" as such a test, the President had the gratification of acknowledging that those directing the 80 per cent. of the gas business who are subscribers to the Association are pre-eminently sane, and he is satisfied that those representing the 20 per cent. are far from being incurables. There are exceptions which show that the test applied is not always a valid one. The cooperation, for instance, of Germany, Austria, Turkey, and Bulgaria, does not by any means attest sanity. However, the President is looking to seeing not many years hence a subscribing list representing the 100 per cent. line of the gas industry. When he consults the list of subscribers, and sees the cities and largest towns expressing through financial support their confidence in the organization and its work, and when he inspects the membership list of the Society of British Gas Industries—all hard-headed business men—he fails to find a reason for there being any undertaking associated with the gas industry standing outside helping to form a group of non-subscribers. Apart from the advancement of the prosperity of the gas industry, the work the Association is doing is one of social value; for educating the public in (among other things) cooking, domestic and industrial heating, and water heating, good is being done in diminishing the foulness, noxious and destructive, that is sent into the atmosphere through the crude modes of heating by raw coal. Mr. Goodenough during the proceedings also had something to say about continuing the efforts to bring the subscribing force up to the possible maximum; and Alderman Phillips is optimistic enough to believe, from an experience he has had, that if the Association does not give in, the non-subscribers will do so. We hope they will not do so merely for the purpose of getting rid of importunity. The best subscriber is the voluntary one, or the one who has been fully persuaded that a cause merits his support. Those who come in against their will are the ones who are likely to be always looking out for some reason for escaping from the obligation to subscribe.

Confidence, Satisfaction, and Work.

The best certificate the subscribers could give of their confidence in, and satisfaction with, the Association was furnished by the report and accounts. If during the war, and in the circumstances created by it, there had been some disposition to fall away from the organization and its cause, there would not have been much ground for surprise; but the contrary is the fact. It was very gratifying to those present to hear the point emphasized by Mr. Goodenough, when moving the adoption of the report and accounts. From gas undertakings, the income of the Association amounted to £582 more than in the preceding year; and the names of 39 additional gas undertakings were entered on the roll. This is very encouraging to the active workers, who have had since the war started a time of considerable anxiety. Votes of thanks are nice and acceptable; but there is to the officers a fine intrinsic value about the foregoing figures. They betoken much; and they tell the workers more than words can do. The Society of British Gas Industries were behind in their subscriptions; but it was the pleasure of Alderman Depree to announce a material addition to the item standing to the credit of the Society in the printed accounts—raising it from £1365 to £2016. The work of the year has been fully maintained; but its ramifications do not constitute a matter about which to talk in detail—one might just as well give away all the details of the transactions of a business establishment. But the workers in the organization are opportunists, and they are unashamed of the *rôle*. They have been taking advantage of the pressure for war material to push into notice the advantages of the industrial uses of gas; they have been making known the value of gas for warming and for hot water supply in the hospital and the sick room; and they have been helping authority, and with large success, to appreciate the value of gas in catering for the inner requirements of the units of our great Army and Navy. There has been advertising in all the main channels by which the public eye is captured; there has been continuity in the production of literature; there has been a constant stream of service to the subscribers; and there has been research into different questions. In the offices of the Association is found a highly organized system; and there is no time to waste there. Plans for the future contemplate the application of some of the energy in new directions.

A Homily on Advertising.

From all this it will be seen that it was a good and satisfying report that Mr. Goodenough had to present. His remarks were much to the point. They also incorporated a little homily on the subject of continuity in advertising, which had appropriateness in more ways than one, inasmuch as the speaker has had a large experience in advertising through both the Gas Light and Coke

Company and the Association, and he was addressing men some of whom—the members of the Society of British Gas Industries especially—are advertisers of varied degree. The point was made by him in support of continuity of effort in the work of the Association; and what he had to say has our complete adherence. It was simply this, that lapse in advertising is not a good thing. It is a matter that has not sufficient place in the rules of business conduct of some of those who trade with the gas industry. From the experience of large advertisers, Mr. Goodenough draws the information that, when there is lapse in advertising, a considerable amount more has to be subsequently spent in recovering from the bad effects created by the lapse. This being the case, there is not economy in the lapse, but something just the contrary. When, too, readers see—and, mark this, there are many observant critics in the gas supply industry—that there is collusion in the periods of lapse in advertising, they naturally ask themselves whether there may not be collusion in other matters. The point made by Mr. Goodenough we have previously put forward in relation to the discontinuance of a few gas undertakings of business in the connecting-up of fresh gas appliances during the war. We are certain that this policy is not a beneficial one—that, indeed, it means the undoing of much of the good work accomplished before the war, and that, when there is a resumption of business, a long length of the road already travelled in effecting the development of business will then have to be retraversed. And this all through the cutting-off of new business because the country is at war.

To the New Year with Confidence.

However, there was little else specially noteworthy. The retiring of members of the General and Executive Committees was postponed until the annual meeting next year. The zealous work of all and sundry for the Association was duly acknowledged; and the members then confidently turned to the new year's work, which is to be carried on under the presidency of Sir Hallewell Rogers, who, like his predecessor genial Bailie Paxton, has been one of the strongest sympathizers and upholders of this piece of highly successful co-operative work.

GENERAL REPORT.

The PRESIDENT [rising amid loud applause] proposed that the minutes of the last meeting be taken as read.

APOLOGIES FOR ABSENCE.

The SECRETARY (Mr. W. M. Mason) then announced that he had received apologies for absence from the Lord Provost of Edinburgh, the Lord Provost of Glasgow, Sir Corbet Woodall, Sir Hallewell Rogers, Sir Daniel Ford Goddard, Sir William H. Stephenson, Mr. D. Milne Watson, Alderman Redfern, Mr. R. J. Neville Neville, M.P., Mr. John Bond (Southport), Mr. H. Wade Deacon (Liverpool), Bailie J. A. Lindsay (Leith), Mr. C. Stafford Ellery (Bath), Mr. C. E. Dovey and Mr. George Clarry (Cardiff), Dr. G. H. Harris and Mr. W. N. Westlake (Exeter), Mr. J. D. Smith (Belfast), Mr. R. Beynon (Torquay), Mr. H. Kendrick (Stretford), Mr. W. H. Bennett (Redhill), Mr. J. W. Auchterlonie (Cambridge), Mr. Charles Clare, and Mr. H. James Yates.

BAILIE PAXTON'S ADDRESS.

The PRESIDENT remarked that the next item on the *agenda* was an address by the President. This address would not be very important; neither would it be very long. He proceeded to read the following

PRESIDENTIAL ADDRESS.

Fellow members,—It was a very great disappointment to me and to the Gas Committee (indeed, to all the members) of the Corporation of Glasgow, which I have the honour to represent, when a year ago the war necessitated the cancelling of the conference which the Association had arranged, at the invitation of Glasgow, to hold in the city. At that time we all hoped that the event was only postponed for a year, and that this October we might be assembling to digest papers and speeches—and other matters perhaps a little less dry—in the Council Chamber, and around the social board, in what we are proud to call the Second City of the United Kingdom.

But "the best laid schemes of mice and men gang aft agley;" and so, thanks to the obstinacy and magnitude of this terrible business which we would all so gladly have seen finished ere this (but only finished—as we mean to see it is finished—with the complete discomfiture of the enemies of civilized humanity), here I am to-day delivering my valedictory address as President without having had the happiness of welcoming across the Border the great assembly of your members in conference, and showing you all we think of the Association in Glasgow.

It was only in the hope and belief that the deferred meeting would be held in Scotland this autumn that I accepted the presidency for the second year upon being urged to do so by the Committee; and it is the very greatest disappointment to me and to Glasgow that this hope has fallen to the ground. The circumstances being what they are, however, no course was open but that taken by the Committee, with the full concurrence of their would-be hosts—namely, to abandon yet again any idea of a national conference, and to hold in London the annual general meeting required by our constitution for the purpose of transacting the necessary formal business.

While we all felt that it was imperative that the Committee should remain in office until the happy day arrives when a national conference can be held and the normal course of events can be resumed, I also was strongly of opinion that it would be in the best interests of the Association that I should, without further delay, hand on the honour of the presidency to the representative of another great city on the list of subscribers. I felt, however, that I could not lay down that honour, which I, your first "elected" President, have deeply appreciated, and for which I thank every member most sincerely, without putting on record in a brief address my firm belief in the value—aye, in the undoubted necessity—of this Association to the gas industry, and my opinion, based upon two years' close observation and first-hand experience, of the way in which its work is being done.

I do not propose to touch upon the detailed records of the past two years. They are to be found in the reports of the Committee, or in the pages of the "Bulletin," and will be referred to by Mr. Goodenough in presenting the report and accounts. What I want to do as briefly as I can is to record my own impressions as your retiring President. Before I took office as President, I was, through my membership of the General Committee for nearly two years, persuaded of the value of the Association's work and satisfied with the conduct of its affairs. So were my colleagues of the Corporation of Glasgow, or they would not have become, as they are, regular subscribers on the full basis—a good test of any man's faith, and not least perhaps of a Scotsman's. But after my two years' intimate acquaintance with all the details of the organization, with the many important services, direct and indirect, rendered to the industry, and with the spirit animating the Committees and officers, my persuasion has become deep-rooted belief, and satisfaction has grown to full-hearted enthusiasm.

I have been particularly struck during my period of office by the business-like conduct of all the Association's affairs, by the constant freshness of policy and ideas put forward, by the alertness to note, and the ready initiative to deal with, new situations as they arise—such, for example, as the relationship of gas to the munitions problem and the thrift problem—and, withal, by the keenness and enthusiasm animating all concerned. No one, in my opinion, could be more zealous and enthusiastic, yet prudent and sound, than our Secretary, who, you must not forget, came from Glasgow, where we are proud of him. The originality, knowledge, skill, and industry of our Editor are steadily becoming known to all of you, but can only be fully appreciated by those on the Committees. The competence and artistic ability of our advertising experts have advertised themselves, and established for the Association a high place in the circles where publicity is criticized professionally. And, finally, there is, under the sound generalship and constant inspiration of our Executive Chairman the splendid spirit of harmony—not necessarily of opinion, but of aim and intention—that has so much impressed me at all meetings of the Committees.

These Committees, comprised of keen business men, representing undertakings (small, medium, and large) in all quarters of the country, discuss thoroughly all the considerable volume of business brought before them month by month and quarter by quarter, with but a single purpose—the good of the industry—and without the slightest sign of personal or district or trade jealousies or any of the other discords that mar so many committees and councils. The gas industry has indeed, in my judgment, much cause to be proud of the success of this great effort of co-operative enterprise, which entails not merely harmony of ideas but the severely practical harmony involved in the pooling of large sums of money to be spent for the general good.

It has been said that "the capacity to co-operate is a test of sanity." Well, it is evident that the great body of the gas industry is pre-eminently sane—and, to judge by the steady inflow of new subscribers, even during this exceptional and trying period, the comparatively small balance are far from being "incurables." I must say that I cannot conceive that any gas committee or any board of directors could possibly remain outside or hesitate to give full support if the members did but once realize what is being done by the Association for them and for every other gas undertaking in the country.

That it is not indifference to, but ignorance of, the work that is being done which prevents those outside from coming in is, I think, clearly demonstrated by the fact that, so soon as the chairman of any undertaking comes to a conference of the Association, whether district or national, and learns the facts, he becomes a keen supporter, and does not rest until he has persuaded his fellow-councillors or directors. I have therefore every faith that before many years are past every gas-works in the United Kingdom will regard its *pro ratâ* subscription to the British Commercial Gas Association as being as necessary an item in the expenditure account as that for coal or wages—a subscription, be it remembered, representing only one penny—just the cost of a postage stamp—per consumer per annum. I am not going, unless I am compelled, to believe that any councillor or director or manager will consciously and wilfully let his undertaking benefit from this co-operative campaign without paying its share of the cost. So I just ask all those who have not yet joined us to consider these facts.

In the past four years nearly £100,000 has been subscribed and spent upon publicity work for the gas industry in these islands (and beyond); and the amount is growing steadily. It has not

been subscribed light-heartedly or for the sake of getting rid of superfluous money. It has been paid out by the experienced and cautious business men of every capital and every leading city in the kingdom. Just look at the list: London, Edinburgh, Cardiff, Dublin, Glasgow, which is not generally credited with prodigality, Manchester and Salford, where the first conference definitely established the Association's place in the industry, and whose rulers know the value of a sovereign at least as well as most, Birmingham, whence we welcome heartily our next President, Sir Hallewell Rogers—one of the ablest of the many able business men in that enterprising city, Liverpool, which mourns the loss of my much-esteemed predecessor in this chair, Belfast, Newcastle, Bradford, Leeds, Sheffield, Hull, Derby, Leicester, Norwich, Portsmouth, Plymouth—the list could be extended until it covered more than 80 per cent. (by volume) of the whole of the gas industry.

Why have the 500 undertakings on our list of subscribers, and the members of the Society of British Gas Industries who have loyally backed them up, put up this big sum of money if it is not because the hard-headed business men directing them realized that there was, and is, a great, a profitable, and a good work to be done in popularizing the use of gas that could only be done effectively and economically by joint effort; and that if the right organization could be established for the work it was the bounden duty of all to contribute their share to the cost?

I have spoken of the popularizing of the use of gas as a good work, and I so regard it, apart from any question of profit to the supplier, because I am a staunch advocate, as indeed is every member of the Corporation of Glasgow, of the effective abatement—if possible the abolition—of that curse of every modern town and city, the smoke nuisance. It is because I believe that this Association is materially helping us to dispel the pall of gloom which, wreathed out of the waste of our national coal resources that pours out of our myriad domestic and factory chimneys, cuts off the sunshine from our streets, destroys our vegetation, undermines the health of our citizens, and depresses the vitality of our workers—it is especially because of this that I give the Association not only my support as a business man, but my blessing as a member of the community, and with all the earnestness of which I am capable urge its claims to whole-hearted support alike upon those who are already on the list of subscribers, that they may continue and increase their contributions, and upon those who are still waiting to be convinced, that they may at once come forward and join hands with us in the work that waits to be done.

The Report and Accounts.

The PRESIDENT said that, his rather trying ordeal being over, he had now to call upon Mr. F. W. Goodenough (the Chairman of the Executive) to present the report and accounts.

The report was as follows:

The General Committee present to the members and associate members and to the administrators of the undertakings and firms subscribing to the Association their fourth annual report and statement of accounts. To make it possible to issue the report and accounts duly audited to the members before the annual meetings, the Committee decided (as announced in the "Bulletin" for April, 1915) to make up the accounts for this and each succeeding financial year to Aug. 31, instead of Sept. 30. Accordingly, the accounts now submitted are for a period of eleven months.

Policy during War Time.

The members present at the annual general meeting held in October, 1914, authorized the Committee to proceed with their publicity work in unabated measure during the year, paying special regard in the details of the campaign to the abnormal conditions prevailing in both industrial and domestic life. The policy thus authorized was subsequently endorsed by the boards and committees of the supporting undertakings in the most practical manner possible—namely, by providing the necessary funds for its pursuance. The evidence of this continued support is seen in the accounts, from which it will be noted that the income from gas undertakings during the eleven months shows an increase of £582 over that in the preceding year. The Manchester Gas Committee, it may be mentioned, gave valued evidence of their appreciation of the work of the Association by passing a resolution to renew their subscription for a further three years certain.

Increase in Number of Subscribers.

What is equally satisfactory—and, under the circumstances, exceptionally gratifying—is the fact that no less than 38 undertakings (including several important municipal gas departments) have been added to the list of subscribers since Sept. 30, 1914—several of them quite recently. The work of the District Membership Committees, which have been formed during the year, and have commenced active operations already in some districts, has contributed materially to this good result—notably by the meetings at Blackburn and Birmingham. When it is possible to resume the holding of District Conferences, which have had to be suspended during the war, it is confidently hoped that the activities of the Membership Committees will bear further fruit.

The output of the subscribing undertakings now represents more than 80 per cent. of the entire gas industry of the British Islands.

The Society of British Gas Industries.

The financial support received from the manufacturers of gas plant and appliances during the eleven months has been very disappointing. It is hoped that this year the deficiency in the contributions* received through the Society of British Gas Industries in 1914-15, as compared with former years, will be made good, in addition to an increased contribution being forthcoming for the year 1915-16.

* Since the closing of the accounts for audit, the Committee are informed that a further substantial sum will be contributed by the Society in respect of the past financial year.

Proposed Addition to the Executive.

In view of the increasing number of subscribers, and for the purpose of ensuring adequate representation of the various districts on the Executive Committee in proportion to the income received from each district, the Committee recommended that rule 10 be altered so as to read:

10.—(*a*) The Executive Committee shall . . . consist of twenty-one members made up as follows:—

(1) The President and first Vice-President (*ex-officio*) and eighteen members to be elected by the General Committee from amongst the members of that Committee, but so that four of them shall be members of the Institution of Gas Engineers and three of them shall be members of the Society of British Gas Industries; and

(2) The Honorary Treasurer, *ex-officio*.

In electing the eighteen members aforesaid, the General Committee shall have regard to the total subscriptions received from each district.

(*b*) A Chairman and Vice-Chairman shall be appointed from time to time by the members of the Executive Committee from among themselves, and shall retire at the meeting next following the annual general meeting, and shall be eligible for re-election. At the first meeting of the General Committee after each annual general meeting six members of the Executive Committee shall retire, and shall be eligible for re-election.

If these alterations be adopted, the districts will be entitled, on the basis of present contributions, to the following representation:

District.	Representation on Basis of Subscriptions.	Representation as at Present.
Eastern	1	—
Ireland	1	—
Manchester	3	2
Midland	2	2
Northern	1	1
Scotland	1	—
Southern	5	5
South-Western	1	—
Wales	1	—
Society of British Gas Industries	3	3
Ex-officio—		
President	1	1
First Vice-President	1	1
	21	15

The Work of the Year.

It will be seen from the accounts that, after providing the expenses of administration (which have, as formerly, been kept below 5 per cent. of the total), and paying off another £1000 in respect of the National Gas Exhibition deficit, leaving a balance of £1325 still to be paid, there has been spent on publicity in the eleven months the sum of £15,186, or slightly more than in the preceding twelve months. The publicity work done during the year has included an active and very productive campaign in the technical as well as general press for extending the use of gas for industrial purposes (especially for the manufacture of munitions); an educational campaign directed to interesting teachers in the manufacture, distribution, and application of gas as subjects for lessons to their pupils; and advertisements and articles in all branches of the press, emphasizing the value of gas in the sick room and hospital, and pointing out the many ways in which gas can assist all classes of the community to practise economy in war time.

The special character of the work has entailed the distribution of large quantities of literature—particularly copies of "A Thousand-and-One Uses for Gas," "Teachers' Notes of Lessons," and "Simple Cookery for the People"—as well as the preparation of a great deal of literary matter in the editorial department, the activities of which have been considerably extended during the year, with excellent results. The correspondence that has been received, and the business that has accrued from the inquiries made, as a result of the publicity work of the year, have shown that the work has been done on the right lines, was well worth the money spent, and has laid a foundation for much additional business alike in the near and in the distant future.

Advertising Literature.

It will be noted that the statement of the production, sale, and distribution of the Association's literature has been treated separately in the accounts this year. It was felt that this change would make for greater clearness. The sales of literature during the eleven months show a considerable falling-off compared with other years, owing to some managers suspending purchases during the first few months of the war. The sale is reviving now that it is generally realized that the advertising of a money-saving and labour-saving commodity is distinctly timely in the present crisis; but the Committee still feel that much greater use might well be made of the excellent advertising material the Association puts at the disposal of its subscribers.

Assistance Rendered to Subscribers.

A steadily growing side of the Association's activities is that to which reference is from time to time made in "The Bulletin," under the heading of "Assistance Rendered." In ever-increasing measure the hope of the founders of the Association is being fulfilled, that it would become a bureau of information, advice, and assistance in regard to all matters relating to the commercial side of gas supply. The records of assistance rendered to subscribing undertakings which periodically come before the Committee show that, in connection with problems and difficulties which arise in their districts, members are constantly seeking and obtaining help to an extent that proves clearly the need and value of the Association.

Research Work.

Mention may be made specially of assistance rendered in connection with questions raised by factory inspectors, and of the practical research work done on such points as the alleged effect of gas heating on pianos, the alleged fading of coloured fabrics through the use of gas lighting, the alleged injury to organs and to mural paintings through the use of gas, and the alleged effect of gas products upon leather—the result being in every case completely to exonerate gas from blame, and to determine the true cause of the trouble.

Work for the Future.

Other work that is in hand includes the consideration of the relations between the gas industry and the plumbers and ironmongers, the preparation of a handbook on the uses of gas for the information of the consumer and especially of architects, research upon the colour-values of various forms of light, and an inquiry into various methods of recording costs and keeping accounts in connection with the sale of gas.

The Election of President for 1915-16.

The Committee have pleasure to report that Sir Hallewell Rogers, J.P., the Chairman of the Birmingham Corporation Gas Committee, has consented to be nominated for election as President for the ensuing year. It may be mentioned that the General Manager of the Birmingham Gas Department (Captain R. S. Hilton), who is a member of the Executive Committee, is at present serving the country as Secretary to Lord Moulton's Committee on Explosives. It will be the hope of everyone that the annual meeting in 1916 may be held in Birmingham, and that the signing of Peace after Victory may have by then allowed Captain Hilton to return unscathed to his work in the industry.

Vice-Presidents.

Since Sept. 30, 1914, one Vice-President has retired (Alderman T. Smith, of Leicester), and one (Colonel Oakden Fisher, of Cardiff) has, to the great regret of the Committee, been lost by death, while the following have been elected: Alderman T. Canning (Newport), Councillor George E. Hilton (Leicester), Alderman A. Nuttall (Blackburn), and Councillor T. Quinney (Coventry).

The Late Mr. Edward Allen.

The Association suffered a severe loss in the much lamented death of Mr. Edward Allen, who was President during the year 1913, when the second annual conference was held in London at the Guildhall and the National Gas Congress and Exhibition. Mr. Allen was one of the original and most enthusiastic supporters of the movement that resulted in the formation of the Association, the progress of which he did everything in his power to promote. He is deeply mourned by every member who had the privilege of his friendship.

International Members.

The names of all international members of enemy-alien nationality have been removed from the register. The number of international members now stands at 63.

Policy for the Ensuing Year.

The Committee strongly recommend that the work of the Association should be prosecuted with unabated force during the ensuing year, but propose that, in view of the difficulties that may arise in some districts in supplying the normal demand for gas this winter, the publicity campaign should be especially devoted to the development firstly of the spring and summer output, and secondly of the heating business in the autumn of 1916.

Members are asked to do their utmost to maintain and increase the income of the Association during the next twelve months, as it is still far from adequate for carrying out in its entirety the productive work on which so promising a commencement has been made in the past four years.

Thomas Paxton, *President.*

Francis W. Goodenough, *Chairman of Executive.*

Mr. F. W. Goodenough, on behalf of the Executive and General Committees, then submitted the fourth annual report and accounts, and amplified somewhat the account therein given of their stewardship. It would, he said, be recognized that the discharge of the duties had not been free from exceptional anxiety in the circumstances of the past year. The Committees and their officers had always been fully conscious of the responsibility placed upon them for the just and profitable expenditure of the considerable sums of money entrusted to them by the subscribing undertakings; and they had been more than ever conscious of this responsibility since the outbreak of war. But for whatever time and thought they had expended upon the administration of the funds of the Association since its inception, and for whatever additional anxiety they had experienced during the past fourteen months, the Committees had been more than fully rewarded by the splendid support they had received in that period from the gas industry throughout the kingdom. Concrete proofs of this support were given by the report and accounts now presented. There had during the past year been added 38 fresh names to the list of subscribing undertakings; while another had come on since the year closed. The income from gas undertakings was £582 more than in the previous twelve months—a fact which spoke for itself, and spoke eloquently. It was true that the support received from the manufacturers of gas plant and appliances showed in the accounts a drop of £1000; but he thought Alderman Templer Depree would be able to give some reassuring news on this point. Indeed, had the Society, before the accounts were audited, notified them—as, owing to a misunderstanding on their part, they failed to do—that further substantial subscriptions would be forthcoming in respect of the financial year, the Society would have been credited with a larger sum in the accounts now presented. If he might venture upon a hint as to how such trouble could be avoided in future, he would suggest that all the members of the Society should pay their subscriptions early in the financial year, instead of waiting until near, or after, its close. The Association was constantly short of "working capital," and would be glad of an earlier inflow of subscriptions—both from manufacturers and from gas undertakings. In this connection, he might say that applications sent out for a renewal of subscriptions had met with a most gratifying response. A letter had arrived that morning from Manchester saying that a cheque would be sent on at the end of the month; and a good many other undertakings had also promised remittances at an early date. They had every reason to be grateful to Manchester for the lead they had always given in this matter. What, however, he wished to emphasize now was the magnificent support received during this anxious period; and he desired to express the thanks of the Committees to all who had contributed to this result, and had in so practical a manner expressed confidence in their policy and administration. He would also, on behalf of the Committees, like to thank the President for the handsome way in which he—a shrewd business man not inexperienced in committee work in other spheres—had testified to the fact that the work of the Association was done in businesslike fashion, and that the members of the Committees laboured harmoniously together for the good of the industry. As Chairman of the Executive and Deputy-Chairman of the General Committee, he could certainly endorse most heartily all the President had said. The spirit of helpful and never destructive criticism, of true co-operation for the common good, that had animated every member and every meeting, had, together with the loyal service of all the officers of the Association, rendered his (Mr. Goodenough's) task easy and delightful. Turning to the accounts, it was not necessary for him to say much more in regard to the income side, beyond thanking the Manchester Institution and the Lancashire Commercial Section for their continued support, and explaining that the fall in receipts from foreign undertakings and international members was due to the war. A certain number of international members had been removed from the register. On the other side, expenses of administration were less than in the previous year by reason of them not including this time the cost of sending representatives to the Munich Gas Exhibition. It was fortunate the President and the Secretary got back from this expedition before war was declared. As in former years, the expenses under the heading of administration represented less than 5 per cent. of the total. In addition to £1000 contributed to the National Gas Exhibition account (which it was hoped to close during the current year), £346 was spent on the "Bulletin," the annual meeting, and the district conferences. They would like to see the expenses for conferences go up again; for these opportunities for discussion and for propaganda work had been sadly missed during the war. This left £15,116, which was increased by drawing on the carry-forward to the extent of £71 to £15,187, to spend on publicity. Of this, £774 was spent as to two-thirds in distributing literature to the public (including copies of "A Thousand-and-One Uses for Gas," sent regularly to many important officials, of notes for lessons sent to teachers, and of other pamphlets usefully distributed), and as to one-third in providing playing cards and matches for the troops. Of the other £14,413, over 40 per cent. was spent upon publicity—carefully planned to meet the special circumstances of the day, alike as regards their industries, public services, and homes—in papers published in the several districts, and spent, of course, in proportion to the amount subscribed by the undertakings in each district. The balance was spent on publicity, similarly specialized, in magazines, popular weekly papers, the journals of the architectural, educational, medical, and nursing professions, and of the building and other trades, and in research work that formed the basis of some of this publicity. In regard to the publications of national circulation in which the Association advertised, it was worthy of mention that when the Secretary made inquiry in Glasgow, and again in Blackburn, he found between sixty and seventy papers of national circulation on the Association's list were sold on the bookstalls. No one not on the Committee could realize the thorough and scientific way in which the case for gas was persistently presented in the authoritative, as well as the popular, Press throughout the country, and not least in the Press which was special to the professions and trades whose goodwill was vital to the gas industry. Every member doubtless saw occasional evidences of the campaign; but the most voracious reader of papers and periodicals could not possibly see them all. Only those who were in touch with the whole of the details of the work could realize its full extent. For this and other reasons, he would strongly commend to the members the proposal to increase the membership of the Executive. The General Committee had already increased their numbers by inviting all Past and Vice Presidents to attend their meetings in an honorary capacity; and personally he would like to see the number of elected members on the Committee increased considerably, because he was confident from experience that the more representatives of subscribing undertakings there were in close touch with the working of the Association the more enthusiasm would there be in its support. He often wished that every director of every gas board, and every member of every gas committee in the country, could spend a few days in the secretarial and editorial rooms, and thus see the letters from the public—from architects, doctors, teachers, and editors, as well as from householders and business firms—the correspondence

with gas managers up and down the country, and particulars in regard to the assistance rendered to them on a multitude of subjects, the details of all the publicity work in hand, and the number of splendid opportunities for publicity that had to be passed by for want of adequate funds. If this could be the case, they would be having subscriptions on the full basis—and the basis increased—from every gas undertaking in the country. They would exclaim: "£17,000 all there is to spend on this far-reaching productive publicity work for the British gas industry, with its annual turnover of £25,000,000! Why, twice the amount would not be half enough." But this wish could not, of course, be fulfilled, though in some lesser, yet growing, measure it would be realized as the Committee expanded, the district conferences met again, and under the stimulus of the district committees achieved even greater success than before, and the annual conferences were resumed. Meanwhile, they would do the very best they could with the means at disposal, if all the members, and the financial powers behind them, endorsed, as the Committee believed they would, the last two paragraphs of the report. In support of the policy of continuity of effort so recommended by the Committee, he might just mention a striking and well-established fact. Whenever an advertiser, with a view to economy, either ceased for a time to advertise or materially reduced his advertising expenditure, he had eventually to spend far more than the amount by which he economized, in addition to his previous full expenditure, in order to make up the ground lost by his reduced advertising. He could give three notable instances of this. One firm reduced its advertising expenditure by 75 per cent. for one year, and for five years afterwards had to spend 50 per cent. more than the original expenditure in order to recover lost business. Another reduced an expenditure of £40,000 a year to £10,000, and had to spend £100,000 in each of the next two years to make good the blunder. The third reduced its annual publicity bill from £75,000 to £35,000 for one year, and had to spend an additional £105,000, spread over three years, over and above the former high level of expenditure, to recover the business lost by "saving" £40,000. It was true that the sale of gas did not present an exact parallel to the commodities here referred to; but in a less marked degree the same result would follow from any slackening in the advertising of the one as did from the same action in the case of the others. There could, indeed, be no doubt that the way to get value out of publicity was to maintain a steady attack upon the attention and interest of the public, and so achieve a cumulative result. In spite of war conditions, all of them could plainly feel at the present time the cumulative effect of the past four years' steady campaign. The current of public favour was flowing with noticeably increasing force towards the gas industry. To withdraw the originating impulse, and let the momentum slow-down and die-away now, would be, in his opinion, the falsest of "false economies." ["Hear, hear."] It might be said that they did not want additional inquiries for gas and gas appliances, as they could not supply any more of either. Well, the motor-car makers in this country could not promise delivery for months, or even years, at the present moment, owing to being occupied on Government work. Yet they continued to advertise, in order to keep themselves in the memory of the public, and so prepare for the day when they would be very glad of orders. If one could not supply a gas-fire to-day, or this winter, it was something gained to have created in a consumer the desire for one, and to have noted his order for action later on. In the gas industry they were not working only for to-day and to-morrow. They wanted to buttress and widen the foundations of the industry for the years to come, to consolidate the property they wished to hand on to future generations, to prepare to-day the way for vast expansion in the future. This was why the Committee asked the members to authorize them, as soon as their income was assured, to proceed with a strong campaign for the development of the daylight load and for the general advancement of gas in popular favour, and why they asked every member to assure them a full, and, if possible, an increased, income for the year that had now commenced. He concluded by moving that the report of the General Committee and the statement of accounts, together with the recommendations for the alteration of the rules therein contained, be approved and adopted.

Alderman F. Templer Depree, J.P. (Chairman of the Council of the Society of British Gas Industries), remarked that, after the very full way in which Mr. Goodenough had moved the resolution, and the references that had been made to the report and accounts, they would no doubt be satisfied if he merely seconded the motion formally. He had, however, been given this opportunity of rising, for the purpose of making one slight allusion to the accounts, which a footnote had prepared them for. Unfortunately, when the accounts were published, for reasons which the proposer had already explained, the amount of subscriptions which the Society of British Gas Industries had contributed to the fund was not made up to anything like the total of the previous year. In fact, the audited account showed a deficit of about £1000. He, however, took an opportunity of explaining that he was quite sure a certain number of subscriptions would be forthcoming which might well go into the accounts of the financial year. He was very pleased to be able to announce to-day that, instead of the amount with which the Society of British Gas Industries were credited in the accounts, the total should be £2016 15s. 6d. He had ventured to point out that there were various reasons for the difference in the amount. It was well known to all those connected with the gas industry—or, indeed, with any other industry—that this terrible war was bound to affect everything. The action of the Government, in withdrawing the loans they had been in the habit of making the gas undertakings for the purpose of increasing their plant, had very much affected certain branches of gas apparatus manufacture—more particularly what were known as the "heavy" branches. They hoped that these times would pass away. Meanwhile, he trusted that those who did intend to subscribe—and he took it that those who had subscribed would continue to do so, as they must have felt the benefit of it—would act on the hint which the proposer of the resolution had thrown out. That was to say that, instead of waiting until the last moment, they would let the Association have the money promptly, so that they could spend it and do good with it, and perhaps avoid placing their Secretary in an invidious position.

Mr. R. W. Edwards (Aldershot) said that, with all due respect to the explanation made by the last speaker, he did think that the difference between the subscriptions of the manufacturers and those of the gas undertakings was too wide. It was a matter which he had on several occasions commented upon. The Society of British Gas Industries should make up their mind to level their contribution up to within reasonable distance of the subscriptions made by gas undertakings. They participated in no small degree in the benefits of the Association; and it did seem to him that the time had now arrived—even if temporarily suspended during the war—when they should make good the deficiency.

Mr. W. E. Price (Hampton Court) said they might congratulate themselves upon the wonderful strides the Association had made in the last few years. He would like to impress upon everyone present the importance of bringing all persuasion that they possibly could to bear upon their Boards of Directors to get in the subscriptions; for in spite of all that had been said, and the encouraging words they had had from the Chairman of the Executive, he thought in some cases it would need all their persuasion, under these special circumstances, to get the amount of contributions which had been forthcoming the last few years. First of all, there was the tightness of money; and, in addition to this, there was—what might probably appeal more to them—the difficulty existing at the present time in carrying out even the orders which were in hand, owing to shortness of material and labour. But obviously the right policy was to continue to press forward, even more than they had done in the past. He was sure those of them who were in at the birth of the Association really marvelled at the size to which it had grown. He did not think any of them really expected that it would grow to the extent to which it had; but even now they should still look forward to the increasing of the Association until, as had already been said, all came in, because it was obvious that for the few who remained out to derive benefit from those who did the paying was unfair. It should only need bringing to the notice of those who practised these methods, to make them see that it was an unreasonable position to take up, and make up their minds to adopt a different attitude, so that the Association could reach the 100 per cent. Subscribers should, he felt, make greater use of the machinery of the Association to get assistance from it. There must be many subjects placed before members of the Association with which perhaps they were not so familiar as might be wished; and they should remember that the Association had the power, and the ability, to supply the desired information, which it would be impossible for one man to do. This method of securing assistance should be very much more used than was the case at the present time. In this connection, special mention might be made of a question that was in the minds of many of them just now—the question of the appliances and material, the various burners, fittings, &c., being used for munitions. This was quite a new branch; and many of them, he was sure, did not feel as able as they would wish to recommend that which was the best for a particular purpose. He was confident that the Association would be able, with the expert ability which it had available, to give assistance and advice, not only to gas undertakings, but also to those manufacturers who were taking on the munition work, and so lead to an increased consumption of gas. Those who looked carefully into what the Association had done would see that very much more could be done; and more use could be made of the Association, if only the members would avail themselves of it.

Alderman F. S. Phillips (Salford) expressed the opinion that, in regard to the report and accounts which were before them, they had every reason for satisfaction, when they looked back upon the short term during which the Association had been in existence, and at the character of the work which it had done. There was, however, one point on which he was not quite satisfied. It was that they had only somewhere about 80 per cent. of the undertakings members of the Association. This was a great achievement in four years; but while he had the opportunity, he wanted to drive home to the members present that it depended somewhat on every one of them individually to do something to alter this figure, and get it nearer the 100 per cent. And to the Executive Committee he would like to emphasize what Mr. Goodenough had said a few moments ago. He instanced certain business firms who, after they had relaxed their advertising efforts, had to expend a very great deal more money to recover their position. Now, some effort had been made during the past year to endeavour to convert the unconverted and bring them into the fold. From the same point of view, these efforts must not be relaxed. ["Hear, hear."] He would like to suggest that the Committee should consider as early as possible further efforts—unremitting efforts, persistent efforts, determined efforts. These people must come in; and

if all exerted themselves individually, he was quite sure they could get them in. He knew of one undertaking that had now come in. He had personally tried this undertaking, and had come away with the feeling that it was perfectly hopeless; and now it was in the Association. It was not his effort that had done it, but with this experience before him, he felt quite convinced that, if the members would not give up, the outstanding undertakings would. If the Association was determined to have them in, they could not stand out; and they must have them in. With regard to the alteration of the rules, this was a healthy sign. It meant that there were more people coming in and taking part in the work; and he was glad that it met with general approval. He looked back to the time when they had not the Association, and when they, as members of a gas undertaking, were, so to speak, secluded in their own respective areas, without any opportunity of conferring with others. He did very much rejoice in the opportunity of meeting good friends in the gas industry; it helped so much. And when one got collective wisdom and collective effort, it was a splendid movement.

Mr. THOMAS BERRIDGE (Leamington) said he was sorry that Sir Hallewell Rogers and Captain Hilton, representing Birmingham and the Midlands, were not present. The former gentleman, who was to be their new President, was, as they were aware, the Chairman of the Birmingham Small Arms Company, and so was probably better engaged at that moment than he would have been by attending their meeting. Captain Hilton, being connected with the High Explosives Department, was also no doubt better engaged. He (Mr. Berridge) could, however, assure the members, on behalf of the Midland gas undertakings, that they would welcome them very cordially in Birmingham next year. They earnestly hoped that by then the war would be over, and that they would be able to get back to something like previous meetings. He was chiefly concerned with the smaller gas undertakings, with some twelve of which he was connected in the Midlands. Eleven of these were in the Association at present; and he was sure that eventually they would be able to record 100 per cent. Every one that had joined had derived considerable benefit from doing so. There was always some little question arising, in connection with which expert advice was needed; and all they had to do was to write Mr. Mason, and secure most valuable advice. ["Hear, hear."] He rather believed himself that a good deal came from Mr. Goodenough; but, at any rate, they got it, and were grateful for it. From his own experience, he strongly recommended everybody to join the Association.

Mr. JOHN YOUNG (President of the Institution of Gas Engineers) said he was also pleased to support the resolution of the Chairman of the Executive. The amount of the work that had been done during the four years' existence of the Association was very, very difficult indeed to realize. If they would just glance back to the time when they had no publicity campaign, and think of the newspapers they studied and the very few instances in which they read of gas or saw a decent gas advertisement, and then looked at to-day, when they could not pick up a paper of any kind without finding—either by advertisement, paragraph, or in some other way—gas thrust upon them in the most delightful manner, they would appreciate the change. He himself had been an advertising man all his business life; but he shrank into insignificance when he reflected on his own feeble efforts as compared with the wonderful work of the Association. He was sure every body of business men would consider it a sound commercial proposition to maintain, and if possible increase, the subscription to the Association. He did not know whether it was always easy to convince large bodies of (say) municipal authorities that money spent in this way was a sound business proposition; but certainly the officials of every gas undertaking realized so strongly the great benefit they received that it would not be their fault if the subscriptions failed to be not only maintained but increased. He looked forward to seeing the 100 per cent. of undertakings which they all wished to come into the fold.

Mr. THOMAS GLOVER (Norwich) remarked that he could really only say "ditto" to previous speakers—especially Mr. Berridge and Mr. Young. He had been asked to support or criticize the report. It seemed to him, however, that the atmosphere was entirely favourable to the Association; and a critic might not find himself very comfortable.

Mr. GOODENOUGH: If you have any criticism to make, Mr. Glover, let us have it.

Mr. GLOVER: Well, I have not. Continuing, he said it would be a very mild one, if there were any. He recently saw a paragraph in a paper which was giving some advice to parsons, in which it was remarked that if parsons would only say less about the reasons why people should go to church, and preach the gospel, perhaps people would go more frequently. It appeared to him that if there was any weakness about the Association, it was that it said a great deal about itself; and it was perhaps only natural to a new and vigorous Association that it should concern itself with itself a good deal. But the advice given to the parsons could be applied to a small extent perhaps to the Association. Let them make the Association so good that reluctant people would come in more readily. He did not know how it was to be done; and probably those at the head of affairs were doing it as hard as they could. All the members appreciated very much the work that had been done, and particularly the ready response they got to any inquiries sent to headquarters. He thoroughly agreed with what Mr. Berridge had said in this connection—that any inquiries sent to Mr. Mason elicited very good answers and very good advice.

The PRESIDENT said if there were no more speakers, he would call upon Mr. Goodenough to reply to the points that had been raised.

Mr. GOODENOUGH remarked that he had really very little to reply to. Alderman Phillips commended to the Executive greater activity in pushing the claims of the Association upon non-subscribers; and Mr. Glover told them not to advertise themselves so much, but to get on with the work. He was afraid these two arguments were mutually destructive. When they had 100 per cent. of support, they would be very glad to give up talking about themselves and get on with their job. It was because the Committee felt that a good deal of energy had sometimes to be diverted from the original objects of the Association to the conversion of the unconverted, that they would, more than anyone else, welcome the advent of the non-subscribers to membership. He thought if Mr. Glover carried his argument to the final point, he would be arguing against advertising gas at all; but he would not be likely to carry it to this extreme.

A LETTER FROM SIR HALLEWELL ROGERS.

Mr. GOODENOUGH (continuing) said Mr. Berridge had referred to the absence of Sir Hallewell Rogers; and he would therefore take the opportunity of reading a letter he received from him, after having formally invited him to stand as candidate for the presidency of the Association. The letter was as follows:

Sept. 30, 1915.

Dear Mr. Goodenough,—I thank you for your letter of the 29th inst., and appreciate the invitation extended to me by the General Committee.

I shall be very glad to accept nomination, but regret that it will be impossible for me to attend the meeting on the 19th of October, as on that day I have to bring before the Council an important Gas Committee report. Every Tuesday, also, I am engaged from 12 till 2 o'clock by a Bank Board.

I shall be glad if you will express my appreciation of the honour at the meeting. I shall, however, quite understand if the members decide to nominate someone who has more practical experience in the work of the gas industry.—Yours faithfully,

HALLEWELL ROGERS,
Chairman of the Birmingham Corporation Gas Committee.

The PRESIDENT then put the motion for the adoption of the report and accounts; and it was unanimously carried.

Alderman W. ARMITAGE (Doncaster) remarked that a duty now devolved upon him which was very slight and very formal. Often in his public life he had plunged into matters which were not formal, and had rather enjoyed the fight. On this occasion, he had a pleasant duty—namely, to move the following resolution: "That, in view of the continuance of the war, the retirement from office of those members of the Executive and General Committees who would otherwise have retired in October, 1915, be postponed until the annual general meeting in 1916." This meant that things were to remain as they were. At election times, when he had to fight for his seat in a certain ward, a resolution of this kind would have suited him admirably. He did not think they could better the men referred to in his motion. No doubt, when the "war drums throbbed no longer, and the battle flags were furled," they would revert to the former condition of things. He felt sure the resolution would meet with the approval of the members, and would be carried unanimously. This was not a time to fritter away possible energy which should be diverted to another direction. When, however, the happy time arrived that the war was at an end, he hoped that the flags would be unfurled, and that there would be such doings as had never been known before in the gas industry. [Applause.]

Mr. J. WILLIAM GLOVER formally seconded the proposition, which was unanimously agreed to.

THE PRESIDENT AND AUDITORS.

The report of the Scrutineers was then received; this being to the effect that Sir Hallewell Rogers was elected President, and Messrs. Cash, Stone, and Co. were re-elected Auditors.

VOTES OF THANKS.

Alderman WILLIAM KAY (Manchester), proposing a vote of thanks to the President, said his services to the Association during the last two years had been unique in every way. For one thing, being the first elected President rather marked him down as a stepping-stone to a very great future for the Association. In Bailie Paxton, they had a President worthy of the huge undertakings which the Association fostered in every possible way. Really, when speaking of the President, he did not know whether he could say anything which they were not all aware of. His geniality, his ability, and his sound commonsense, and the admirable way in which the meetings he had presided over had been conducted, were all well known; and if he (Alderman Kay) spoke till Doomsday, he could not say more to commend him to the members.

Mr. CYRIL G. DAVIS (London), in seconding, remarked that it was hardly necessary for him to add anything to what Alderman Kay had said. They were certainly fortunate in having, at this very dreadful period of their lives, a man as President with such strength of character and such a broad mind as Bailie Paxton.

The motion having been put to the meeting and carried with applause,

The PRESIDENT said he was proud of having received such

a warm vote of thanks. The Association had been very good to him. It had extended great sympathy and help to him in his little efforts on its behalf. They were good enough to send him on one occasion with Mr. Mason to Munich. They had a splendid time there, and were lucky enough to get back before war was declared. He sincerely thanked them all for their great kindness to him during the past two years. It was his hope and belief that the work of the Association would go on prospering, under the able guidance of the Executive now in charge of it.

Mr. FRED TILLEY (London) proposed a vote of thanks to the Committees and officers who, he said, had been working so hard for the Association during the past year. It was surprising to receive so many communications from them, giving all kinds of useful information. The "Bulletin" itself must take up a considerable amount of time. Although no doubt it was a pleasant task, the ordinary business man in these days had not always time to tackle such an undertaking as this must be. It showed that the Executive Committee were causing a very great amount of work to be done which benefited the gas industry as a whole.

Mr. GEORGE STEVENSON (Long Eaton), in seconding, said the President in his address had already paid very generous tribute to the work done; and he was quite sure that all the members cordially agreed with every word that had been said. His own opinion was that no Association could possibly be better served, or at less cost; and though this vote of thanks might seem rather formal, he believed it was the wish of every member that the Committees and officers should take it as a very sincere and very cordial one.

The proposition having been heartily endorsed by all the members,

Mr. GOODENOUGH, replying on behalf of the Committees, remarked that, as he had said in moving the adoption of the report and accounts, the Committees got their full reward for all the time and trouble they might give to, or the work they might do for, the Association, in the splendid and increasing support which the Association received throughout the country. Beyond this reward, they asked for nothing. But it was a very great pleasure indeed to feel that they had the good-fellowship and good-will of the members, as well as the practical support which was so vital to the success of their work. He would like to pay tribute to the excellent work done by all the officers of the Association—Mr. Mason and his assistant, their Editor, and their Advertising Agent. They, together with himself, formed a sort of inner cabinet who had to deal with working details from day to day; and he could say that in this inner cabinet, while there was plenty of discussion and disagreement on details, they always arrived at a harmonious conclusion. He got assistance from every member which was invaluable to him, which he greatly appreciated, and from which the Association derived great value.

Mr. MASON, for the officers, said the feeling in his heart that day was that they had a tremendous lot to be thankful for. It was always good to have work well done behind one; and the Committees and officers certainly had this. He would like to point out that the accounts did not show on the surface the biggest asset the British Commercial Gas Association possessed. This asset was the Chairman of the Executive, Mr. Goodenough; and he (Mr. Mason) could say most sincerely that it was a very real inspiration to have the privilege of working beside such a man. [Applause.]

The PRESIDENT said there was one other proposition. They had that day held three meetings there; and it was very good of the Council of the Society of Arts to give them the use free of their beautiful hall. He proposed a hearty vote of thanks to them for their kindness.

Mr. GOODENOUGH seconded this, and it was heartily agreed to.

This concluded the business; and the members separated after taking tea together.

THE AMERICAN GAS INSTITUTE MEETING.

[FROM OUR OWN CORRESPONDENT.]

When the Institute, three years ago, accepted the invitation of the Pacific Coast Gas Association to act as the sponsor for an International Gas Congress, it was clearly understood that the location of San Francisco would prevent the attendance of many Institute members, who would not be able to make the journey of over 3000 miles, and that, because of the sessions of the Congress, the meeting of the Institute must be limited to a brief business session. Therefore the meeting called to order on the afternoon of Tuesday, Sept. 28, by President E. C. Jones, had no papers to consider, and received most of its Committee reports by title. In the circumstances, the number in attendance (about 100) was considered quite satisfactory.

REPORT OF THE DIRECTORS.

The first item was the Directors' report. This announced the election to life membership, without the payment of any fee, of Mr. Frederic Egner, "as a fitting reward to a life of effort for the benefit of the gas industry;" it touched on the diversified energies of the Technical Committee working through its various Sub-Committees, and the value of the Public Relations Committee acting as a skilled adviser in the interests alike of consumers and sellers of gas, in the settlement of the many questions which arise between the latter and the public service commissions; and it recommended certain changes in the constitution affecting affiliation with State Associations and the organization of the Institute sections.

MEMBERSHIP AND FINANCE.

The Secretary reported the election during the year of 69 members. The financial statement disclosed that a deficit of almost $5000, due to the increased expenses caused by the 1914 meeting, had now been covered by special subscriptions from various gas companies.

THE PRESIDENT'S ADDRESS.

Mr. Jones then delivered his Presidential Address. He began by calling attention to the fact that no National Gas Association had hitherto held a meeting west of Denver. This was not strange when it was realized that with London as a centre, a circle whose radius was the 3300 miles distance between New York and San Francisco would include Newfoundland, Greenland, Europe, and about one-fifth of Africa; so that a Congress in London would be as near to the dwellers in the above-described area as San Francisco is to most of the Institute members.

He spoke of the Collective Gas Exhibit, the facts concerning which have already appeared in print; but it may be stated here that it is lighted by gas, occupies 10,000 square feet of space, is a "convincing exponent of the economy and efficiency of gas illumination," and was awarded a Grand Prize. He urged a study of the work of the various Committees and its continuation, to the end that "the Institute may become a clearing house for the settlement of questions of policy relating to all departments of the gas business."

He referred to forty years of unfaltering devotion to the gas business, "during which no fear of the future glory of the gas business, nor loss of faith in its eventual predominance, has ever crept in." "The success of our business depends on the individuals engaged in the various departments, and grave responsibility rests upon the men who are the framers of its destiny. An unshaken belief in the efficiency and economy of gas for all purposes is necessary to a permanent development of the business, and the agents must be gas men, not gas-and-electric men."

The appointment of a Committee on the President's Address was deferred, owing to the lack of time for the performance of its duties. Its report will be printed in the "Proceedings."

OFFICE-BEARERS.

The Nominating Committee presented the following names, which were unanimously elected:

President.—W. E. M'Kay, Boston, Mass.

Vice-Presidents.—Manufacturing Section. — Herman Russell, Rochester, N.Y. Chemical Section.—Dr. A. H. Elliott, New York City. Distribution Section.—J. D. von Maur, St. Louis, Mo. Illumination Section, C. O. Bond, Philadelphia, Pa. Accounting Section.—J. P. Crowley, St. Paul, Minn.

Directors.—D. D. Barnum, Worcester, Mass.; R. B. Brown, Milwaukee, Wis.; C. M. Cohn, Baltimore, Md.; G. B. Cortelyou, New York City; R. B. Harper, Chicago, Ill.; and R. W. Bush, Brooklyn, N.Y.

This is the first year that Sectional Vice-Presidents have been elected, and each is expected to assist the Technical Committee in directing the work of the Institute on subjects belonging to his section. This organization should go far in making the 1916 meeting and the work of the coming year even more successful than the 1914 meeting, and the effort it marked.

COMMITTEE REPORTS.

Though the Committee reports were with few exceptions read by title only, their contents will be briefly given here, as they may not be in print for some time, and the meeting report would be incomplete without at least a summary of what the Institute has been doing this past year.

The Public Relations Committee described their activities during the year with gas companies and public service commissions, and the formation of a Sub-Committee on Installation Regulation and Safety Code to co-operate upon these questions with the Bureau of Standards and the National Fire Protection Association and other fire insurance bodies.

The Technical Committee summarized the work of the various Sub-Committees, reported changes in the routine of their appointment (by which committees whose work was not completed at the end of the Institute year would be continued, subject to any change that might be desired by the incoming Technical Committee), recommended enlisting the technical assistance of the affiliated Associations, and giving wide publicity in the "Institute News" from month to month of the work being done.

Considering, now, the Sub-Committees working under the Technical Committee, there were the following reports.

The Committee on Accident Prevention gave an analysis of 6000 accident cases, under causes and effect of accidents. Last year 3500 cases were analyzed. A revised plan for a company's safety organization was submitted, together with new safety rules and precautions. A motion picture film, showing the safe and unsafe ways of doing daily tasks in the industry, accompanied the report. The film gave views of present and past officers of the Institute. It is expected that the film will be loaned for use by

gas companies throughout the country, and will be of great service in inculcating safety ideas.

The Bureau of Information submitted data as to questions received and answers given during the year, and also stated that there was reason to believe that at present there was no real need for the Question Box, for without artificial stimulation, questions were not being received. It was thought that if the work was to be carried on it should be done by a paid employee, rather than by a voluntary Committee as in the past.

The Committee on Carbonization this year decided to make a study of coke, and in so doing described the formation of coal and its mining and preparation for market, presented the results of numerous investigations upon the effect of storage on coal, and from these investigations made certain recommendations. A general outline of the coke requirements for metallurgical and domestic use was given, together with a description of the usual methods employed to produce a metallurgical coke. The report concluded with some remarks upon the formation of coke, and described several series of experiments showing the effect of various methods of carbonizing upon the character of the coke produced.

The Committee on Chemical Tests has enlarged the tentative "Gas Chemists' Handbook" submitted by Mr. Fulweiler last year, and it now embodies the best information obtainable in the present state of the art; so that it may be "safely used not only as a laboratory manual," but also for the purchase of raw material used in the gas business. It will be published early in 1916.

The Committee on Classification of Gas Engineering reported that at the beginning of their work they found a great demand in other lines of engineering for a suitable classification. The movement had now grown into one embracing 44 societies and institutions, and there is good reason to hope that in the end a classification could be adopted which would care for all branches of engineering, would serve as a basis for filing clippings, for cards in a card index, and for printed indexes, and that the publishers of technical periodicals might be induced to print against each important article the symbol of the appropriate class in this system, so that, by clipping these articles, a file might be easily made which would combine in one system these clippings, together with all other material to be classified by the same system.

The Committee on Gas House Piping presented a report containing suggested specifications governing the installation and testing of house piping and the installation of house services. The report included two tables—one for water gas and the other for coal gas—each embracing pipe from ¾-inch to 4 inches in size and from 1 to 1000 openings, and giving the number of feet of pipe allowable for 0·1 inch in pressure. The report was regarded as one of progress; and its recommendations will be before the Institute at least a year before any action is taken on them.

The Committee on Gas Lighting reported that, as preliminary to prescribing standard conditions for testing gas-lamps so as to determine their rating, tests of three representative lamps—three-burner inverted arc lamp equipped with clear globe, single-burner nverted lamp equipped with clear air-hole cylinder, and single-burner upright lamp equipped with clear air-hole chimney—are now under way in four laboratories, one of these being that of the Bureau of Standards. Also, that at one laboratory tests of the same kind had been carried on by testing standard equipped lamps on local gases of different composition. The Committee also hoped to start three other lines of work, as given below:

1.—Reach an agreement, if possible, as to the proper place or places for such tests, and begin the collection of actual data on the efficiency performance, distribution curves, &c., of lamps to be rated in accordance with the standard conditions for testing gas-lamps.

2.—A study of the methods of ignition, including distance ignition, looking to the approval of those which are safe, certain, and convenient.

3.—Determine the characteristics of the ideal gas suited to give high efficiency and good service with present lamps on the market.

As part of its report, the Committee submitted a tentative, but very complete, glossary of words, terms, and phrases used in the subject of gas lighting, compiled by Mr. R. B. Harper.

The Committee on Gas-Works Auxiliaries limited its work this year to the "instruments which the gas engineer may use in keeping himself informed of the conditions of plant operations." The report is divided as follows:

Part 1.—The development of an averaging Pitot tube device for measuring the flow of gases in pipes.

Part 2.—Various types of pressure gauges, manometers, and U tubes; their use and proper application in gas-works.

Part 3.—Various types of pyrometers, basic principles of their operation, and proper application in gas-works.

The Committee on Meter Connections submitted drawings of various methods in use for setting meters and of meter-cocks with specifications for their composition, and asked for suggestions for the use of the Committee next year. The whole idea of the report is to attract attention to the subject of meter connections, with the hope that, as a result, some decision can be reached as to the standard methods for each type of connection used in this country.

The Committee on Physical Tests have done some work, and expect to submit a report for the "Proceedings," but had none ready for the meeting.

The Committee on Cast-Iron Pipe Joints presented a preliminary report in which the theory of the bell-and-spigot joint was discussed. Current practice in joint-making was shown by a table summarizing the conclusions from 58 answers received in reply to a circular sent to 70 large companies. These replies indicated that cement joints were being used for small mains in two-thirds of the cases, and were entirely satisfactory; also that lead wool was being used in large main joints by one-sixth of the companies, and was entirely satisfactory. A proposed specification for cement joints was given, which represents departures from standard practice in certain respects, and which will undoubtedly be criticized by the members of the Institute before its adoption. The report concludes with a short description of some tension and compression tests on various forms of large main joints. These would so far indicate that a joint made by putting into a bell 4½ inches deep, about ¾ inch of yarn, and inserting cement until there is only just room enough for 1¼ inches of lead wool, will stand more reversals of pressure under higher stress than any other form of joint—the small lead wool being, however, almost as good. Some of the experiments also indicate that the amount of compression of the yarn has much to do with the ability of the joint to remain tight under stress and motion.

The Committee on Pipe Standards, whose principal duty it is to promote the use of the standards already adopted, reported the addition of a few special castings.

The Committee on Refractory Materials has held several meetings during the year, and has made good progress; being greatly aided by the manufacturers and the Bureau of Standards. Its report, however, was not ready for the meeting.

The representatives of the Joint National Committee on Electrolysis stated that the report of the Committee would probably be complete within a year.

The Committee on Supplying Large Buildings with Gas presented as its report a table of contents of a proposed book intended as a data and reference book for architects and builders. It is the intention of the Committee to complete the work during the coming year. The suggested table of contents is as follows:

I.—Introduction.

II.—Gas service: (*a*) Continuity and character of service. (*b*) Reliability of supply. (*c*) Quality of supply. (*d*) Quantity of supply.

III.—Why buildings should be piped for gas: (*a*) 1 Modern building principles. 2 Changes in character of occupancy. (*b*) Financial aspect. (*c*) Tenants who use gas.

IV.—Uses of gas: (*a*) In the home. (*b*) In the industries. 1 Advantages. 2 Lighting appliances. 3 Fuel appliances. 4 Power appliances.

V.—Gas as an illuminant: (*a*) 1 Advantages. 2 Artistic considerations. (*b*) Flexibility. 1 Sizes of units. 2 Consumption of units. 3 Candle power of units. (*c*) Control. 1 Systems of control. 2 Pilot light consumption. (*d*) Hygienic value. 1 Quality of light. 2 Effect upon the eyes. 3 Aid to ventilation. 4 Safety. 5 Effect of gas light upon the atmosphere. (*a*) Oxygen reduction. (*b*) Heat generation. (*c*) Carbon dioxide generation. (*d*) Effect on humidity. (*e*) Air movement. (*f*) Reduction of bacteria.

VI.—Gas as a fuel: (*a*) Provision for future demands. (*b*) Advantages. 1 Reliability. 2 Safety. 3 Economy. 4 Convenience. 5 Cleanliness. 6 Ease of control. 7 Space economy. 8 Labour economy. 9 Operating economy. 10 Applicability. 11 Table of fuel appliances.

VII.—Gas as a source of power: (*a*) Advantages and scope of field. (*b*) Considerations governing choice of power unit. (*c*) Horse power required for various classes of service. (*d*) Cost comparison—gas *v.* electricity.

VIII.—Gas piping: (*a*) Piping at time of erection. (*b*) Cost of piping at time of erection. (*c*) Cost of piping after erection. (*d*) Piping layouts. (*e*) Standard piping specifications.

The Committee on the Utilization of Fuel Appliances, in a brief report, again calls attention to the desirablity of using ranges built according to the standard specifications. It speaks of the gradual development of the "fireless cooking," or heavily insulated, range, which is slowly finding a place for itself. For small kitchens, it advocates a range with both a baking and a broiling burner in the same oven, if proper means are taken to prevent their simultaneous operation. It speaks of the rapid increase in the use of water-heaters, both with and without thermostatic control. It states that the latter gives satisfactory service, except when uniform temperature of the water is required. It states that some gas companies will experiment this Fall with auxiliary gas-fired heaters attached to central heating systems, in the hope that the convenience of gas heat under these conditions will open its way to such use in many houses. It announces that the efficiency tests of gas room-heaters will soon be completed and published as an appendix to the report. It exhibits, for the purpose of inviting discussion, a design for slip-end hose cocks.

Place of Next Meeting.

After these technical reports had been disposed of, the Committee on Next Place of Meeting asked permission to refer such choice to the incoming Board of Directors; remarking, however, that Chicago had been under consideration.

The Beal Medal.

The Committee on the Beal Medal, for the best paper contri-

buted to the 1914 meeting, announced their award to Mr. F. W. Steere, for "An Electrical Process for Detarring Gas."

The Presidency.

The Institute then recessed under a motion by which final adjournment occurred on Friday midnight. This had the effect of allowing Mr. Jones, whose term of office expired with the meeting, to remain President during the sessions of the Gas Congress, and the accompanying entertainments. At this juncture it is eminently fitting to record the energy, enthusiasm, and hospitality of this ever-young standard bearer of the interests of gas, whose every look and act belies the years of his known achievements. Every traveller from afar will take back home renewed courage and pleasant memories derived from his contact with this Nestor of the West.

Next Year's Candidates.

After the Institute meeting, the various sections met to choose candidates from which next year's Nominating Committee will choose one Vice-President from each section. The names are: Manufacturing, G. B. Evans, J. H. Eustace, W. C. Morris. Chemical, J. M. Morehead, C. C. Tutwiler, E. C. Uhlig. Distribution, J. W. Batten, C. C. Simpson, jun., G. I. Vincent. Illumination, Norman Macbeth, J. A. Norcross, E. C. Jones. Accounting, F. R. Barnitz, William M'Clellan, H. W. Peck.

The Social Events.

As the Institute meeting was entirely subordinate to that of the Gas Congress, the entertainment features of the latter took the place of the usual social side of Institute meetings, and will be described when relating the events of the Congress.

GLOVER-WEST VERTICALS AT OTTAWA.

The Ottawa Gas Company is relatively not a very large concern; gas lighting being almost *nil* and the bulk of the gas being used for cooking—a service not yet developed to anywhere near its possibilities. Nevertheless, the Company found themselves requiring new gas-works; and, with Messrs. Merrifield and Burnett, of Toronto, as Consulting Engineers, they have had a plant designed and laid out on paper for an ultimate capacity of 6 million cubic feet per day, divided into four self-contained units of 1½ million cubic feet, only one of the units to be built in the first instance. After a study of the various systems of carbonization, the Glover-West continuous vertical retorts were selected for the first unit; and in regard to them, Mr. A. A. Dion, the General Superintendent of the Company, read a paper at the recent eighth annual meeting of the Canadian Gas Association.

Description of the Installation.

After his preliminary observations, Mr. Dion said: The carbonizing plant consists of a stack of six settings of Glover-West vertical retorts, eight retorts to each setting, 48 retorts in all. The contractors' rated capacity of each setting is 300,000 cubic feet per diem, or 1,800,000 cubic feet for the six settings. We rate the plant as being capable of making 1,500,000 cubic feet per diem under ordinary conditions of working, day in and day out; and experience indicates that, allowing for proper scurfing periods and without forcing the benches, each setting will make considerably over 250,000 cubic feet, at which we rate its capacity. Complete provision has been made for the mechanical handling of coal and coke. The coal-cars coming in over our siding are shunted within our grounds as required, by means of a small electric locomotive getting current from an overhead trolley system. The coal may be dumped into an underground hopper, whence a grab-bucket, electrically operated, on a telpher system, takes it to storage or directly to the crusher, or the cars may be unloaded from overhead also by grab-bucket.

The coke is conveyed to a coke-pocket, under which carts may drive, or it may be carried by grab-bucket and loaded upon cars. When the coke-pocket is full, coke may be carried along a steel trestle and piled on the ground, or it may be stored in a part of the coal-storage building.

The coal telpher system and coke telpher system are interchangeable, so that one can replace the other in case of stoppage for repairs, &c. The use of the vertical retorts, coupled with this mechanical handling of coal and coke, has resulted in considerable reduction in labour over less modern arrangements.

The other parts of the plant possess no unusual features and seem to conform to recognized good practice.

The vertical plant was started on March 29 last, and gas was turned on to the mains on April 1. It has been in continuous operation since that date, with a varying number of retorts in action, according to the fluctuations in the output of gas. At no time since commencing operations has there been the least interruption in the manufacture of gas, and the whole installation works smoothly, with adequate attention. It is a pleasure to be able to say that, from all view-points, this installation of verticals has been a success so far, and that the expectations of the owners and managers have been fully realized in practice. The gas produced has been of uniform quality, the yield large, and the heating value well up to the requirements of the Government. The public has not been slow to recognize the improvement, especially as the distribution of gas from the new works has resulted in a more uniform pressure throughout the city and throughout the hours and days.

Results of Working with Pittsburgh Coal.

The following data were taken from the Company's records for the months of June and July. The coal carbonized during this period was from the mines of the Pittsburgh Coal Company (thin vein Youghiogheny coal, three-quarter lump), and an analysis lately made of an average sample gave this result:

Volatile matter	31·400 per cent.
Fixed carbon	63·395 ,,
Moisture (after drying)	0·205 ,,
Ash	5·000 ,,
Sulphur	0·828 ,,
Volatile sulphur	0·276 ,,

Gross calorific value per pound, 17,700 B.Th.U.

The quantity of coal carbonized during the two months was 3212·75 tons (of 2000 lbs.), and the total quantity of gas made, corrected to 60° Fahr. and 30 inches barometer, was 42,835,811 cubic feet. This is an average of 702,226 cubic feet per day, and 13,336 cubic feet per ton of coal, or 6·668 cubic feet per pound. The calorific value of the gas averaged 542 B.Th.U. during June, and 531·74 B.Th.U. during July. The minimum was: June, 511 B.Th.U.; July, 521·5 B.Th.U. The maximum: June, 573 B.Th.U.; July, 561·1 B.Th.U. These figures are confirmed by Government tests. The tests were made on a Simmance-Abady total-heat calorimeter of the type adopted by the Canadian Government for use at their testing-stations throughout the Dominion.

The yield of gas per ton of coal was found to be quite satisfactory, and rather better than expected. As a very small quantity of steam is at all times admitted to the lower portion of each retort for the purpose of assisting in the cooling of the hot coke before it reaches the extracting chamber, a percentage of the gas yield should be credited to the water gas formed by the decomposition of the steam while passing through the hot coke in the retorts.

The yield of coke per ton of coal carbonized during the period was 1343 lbs. The quantity of coke used in the producer furnaces averaged 17·68 lbs. per 100 lbs. of coal carbonized during June, and 16·36 lbs. in July. The quantity of coke used in the producer furnaces is rather high for the type of benches installed. But this is accounted for by the fact that the benches are not being worked to their full capacity at any time, and also owing to the local conditions of output—this varying considerably from week to week, and necessitating frequent slacking-off in production, which, of course, results in idle retorts, and therefore in increased fuel consumption relatively to the coal carbonized. When running to capacity, the producer fuel is calculated as 13·07 lbs. per 100 lbs. of coal carbonized.

The ammonia plant was not put into operation until lately, and some defects still remain to be corrected; so that the yield of ammonia has been low, and it would be useless to give the figures, since they would not represent normal operation.

Labour Required.

After some coaching on the part of the representatives of the West Company, who erected the retorts, no difficulty whatever was found in adapting the old operators to the work. It was not found necessary to bring in any other experts to help the Company out. One man is employed at the top charging the retorts, and pricking the coal when required. One man at the bottom looks after the producer furnaces and the discharging of the coke. There are three shifts of eight hours, or six men for the twenty-four hours. Two men are employed scurfing—only one shift of ten hours; two men on the mechanical conveyors with one helper—one shift only. Over all these men is the retort-house foreman.

Taking records from the start—namely, April, May, June, July, and August—the average gas made per retort and producer man per day (six men) was 120,148 cubic feet.

The Late Mr. De Brouwer.

"Het Gas" of the 1st inst. gave some further particulars of the life work of Mr. Joseph de Brouwer, whose death on the 27th of July last has already been reported in the "Journal." He was born on Nov. 2, 1843, and in 1865 graduated as Doctor of Law at Louvain, with a view to following the career of counsel. His father, M. Jean de Brouwer, who had interested himself in the erection and exploitation of gas-works, died suddenly, and the son found himself left with the control of four works, including those at Bois-le-Duc, at a time when gas engineering had not reached a high stage of development. He turned his great abilities earnestly towards the new career which was thus thrust upon him, and took special interest in all technical advances. He followed closely the patent section of technical literature; and his own inventions of the De Brouwer coke-conveying trough and the charging and discharging machine achieved world-wide recognition of his inventive talent. He interested himself greatly in inter-communal gas supply—especially in the district of Flanders between Nieuport and Gheel. He was the recipient of distinctions from the Belgian, Dutch, and French Gas Associations, and received a cross of honour of the first class from King Leopold the Second.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Opening Meeting of the Session.

At the Westminster Technical Institute, Vincent Square, S.W., on Friday, the London and Southern District Junior Gas Association held their opening meeting for the present session—the chair during the early part of the proceedings being occupied by Mr. J. HEWETT, of the South Metropolitan Gas Company, the retiring President. In view of the fact that so many of the members are still away on active service, and other circumstances, there was a satisfactory muster of members to hear the address of Mr. S. B. CHANDLER, of the Sales Department of the South Suburban Gas Company, the new President of the Association.

THE PRESIDENTIAL ADDRESS.

Mr. HEWETT, in calling upon Mr. Chandler to read his address [which will be found on pp. 198-200], said he hoped the members would one and all extend to that gentleman the hearty support they had given him during his period of office. He remarked that the subject of distribution interested the members, if not more than, at any rate as much as, the manufacturing side. It was, however, the business of all of them, whether they were attached to this particular department or another, to know as much as they possibly could about their industry as a whole. There were no doubt many points in the address which would help them.

Mr. F. J. PEARCE, proposing a hearty vote of thanks to the President, said the subject he had taken for his address had been dealt with clearly and concisely.

Mr. W. E. BROWN, in seconding the vote [which was cordially passed], remarked that the address contained a lot of information. Among many points touched upon by the President was the part played by the gas industry in the present crisis. Very few people outside the industry, he thought, really appreciated what gas and gas making meant to the country just now. There was not only the manufacture of high explosives, and that sort of thing, but the fact that the gas industry represented the economical use of the coal supplies. This was a point of national importance which had just now come very much to the front. Another striking matter to note was the way in which the age of science was supplanting what might be called rule-of-thumb methods. This applied right through, not only in their works, but also in connection with the manufacture of apparatus. The question of the rates for electric current was, of course, a curious one. The methods of charging were really very wonderful. It was a puzzle how their competitors could have devised them all, and a still greater puzzle how they could settle their arguments and disputes with customers afterwards. A point in the address which would appeal to them all very strongly was the one about the mental disposition of the chiefs of departments, and the qualities required. There was no doubt a man who was going to successfully run a big department, must be able to take every person and every thing as it came along, quite on an independent basis.

The PRESIDENT returned thanks, and assured the members that the reception of his address had amply repaid him for such time and trouble as he might have expended on its preparation. His best endeavours would be given towards furthering the interests of the Association, which he regarded as a very serious proposition. It was a stepping-stone to higher things, and though junior in title, it was by no means junior in other respects.

FORTHCOMING MEETINGS, &c.

The PRESIDENT, alluding to the programme, pointed out that during November there would be two business meetings of great interest; and he hoped that members and friends would attend in large numbers. On Nov. 12 Mr. Hartley, of the Richmond Gas Stove and Meter Company, would give them a paper, illustrated by lantern slides, on the "Development of Gas-Fires, 1913-15;" and a fortnight later Mr. D. W. Brooks, of the Gas Light and Coke Company, was to deal with "Gas-Furnaces." These were both exceedingly important subjects. Altogether the session promised to be a very interesting one. They would notice that the programme contained a "Roll of Honour" of members of the Association serving with His Majesty's forces. This contained 26 names; and there were two more to be added—Mr. C. R. Peel, of the Gas Light and Coke Company, who had joined the navy, and Mr. A. Broadbent, of the same Company, who was in the Royal Engineers. He wished them a speedy and happy return. He added that in view of the existing exceptional circumstances, and in deference to the wishes of the London County Council, it had been determined that for the present the meetings should begin and terminate at an earlier hour than had hitherto been the custom.

A COUPLE OF PRESENTATIONS.

The PRESIDENT said he had now a very pleasant duty to fulfil—namely, to convey in some tangible form to the late President and Hon. Secretary the appreciation of the members of the valuable work they had done. The presentations he was about to make consisted of framed illuminated addresses, recording resolutions passed at the last annual general meeting of the Association. In the case of Mr. Hewett, he was quite sure this recognition was thoroughly well deserved. He was a good all-round man, and had upheld the Association in an admirable manner during a time of extraordinary pressure and upheaval of the country. He hoped that Mr. Hewett would long derive satisfaction from the testimonial which he now had the pleasure to hand to him, and which was in the following terms.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

This Annual General Meeting of the London and Southern District Junior Gas Association desires to acknowledge and place on record its appreciation of the services rendered by Mr. J. Hewett, in conducting the affairs of the Association as President during the session 1914-15. The energy and enthusiasm he displayed at all times have materially enhanced the usefulness of the Association, especially in view of the serious difficulties created by the war in which our country is engaged; and the members hereby tender him their sincere and hearty thanks.

SAML. B. CHANDLER, President.
GEORGE WINSLOW, Hon. Secretary.

Mr. HEWETT, acknowledging the gift, said he accepted it as a token of the members' appreciation of his efforts. When he was elected President, he realized that it was not altogether easy to fill the position in connection with an Association of this character, which was recognized throughout the country as being by no means junior in importance.

The PRESIDENT said he had now to hand the other address to the late Hon. Secretary. The members all recognized that this was a position to which there was a good deal of hard work attached; and although they very much regretted to lose Mr. Griggs's services, they quite understood that, owing to other duties, he was unable to give that time to the affairs of the Association which he considered was required. The testimonial was in the following words.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

This Annual General Meeting of the London and Southern District Junior Gas Association desires to acknowledge and place on record its appreciation of the services of Mr. Arthur R. Griggs as Hon. Secretary during the session 1914-15, tendering him sincere thanks for the energy displayed and for the time given in the interests of the Association.

SAML. B. CHANDLER, President.
GEORGE WINSLOW, Hon. Secretary.

Mr. GRIGGS, in returning thanks, said the address came as a very pleasant surprise, and he much appreciated the gift. The President had explained the reasons why he had felt it necessary to resign the secretaryship; and he could only add to this that he regretted very much to have to do so. He could not have had a better President and Council to work under.

This concluded the business proceedings; and light refreshments and a discussion of things in general followed.

PORTLAND CEMENT.

When free lime is present in cement—a fact which cannot be demonstrated by chemical means—its presence is only indicated by a lack of cohesion and strength in the cement some weeks or months after it has been hydrated. Consequently, various tests have been devised to accelerate the action of any expansive constituent, so as to produce evidence of unsoundness in a few hours or days. The test for this purpose most generally accepted is to submit a test briquette to the action of high-pressure steam. The latest information on this point is contained in Technologic Paper No. 47 just issued from the Washington Bureau of Standards.

For the purposes of the test pats of neat cement were made up as usual and stored for twenty-four hours in a damp closet, and then subjected to a steam pressure of 300 lbs. per square inch for at least one hour—the total time in the high-pressure boiler being three hours. A cement is said to pass this test when it exhibits no cracking, warping, or disintegration on examination after the treatment. From experiments on a large number of cements, it is concluded that such a test may be of value in forecasting the behaviour of neat cement or a very rich mortar when exposed under normal conditions in dry air; but it will not forecast the behaviour of cements in concrete as normally exposed.

For practical work under normal conditions of construction, the results of the investigation fail to show that the high-pressure steam test is of any value as a means of determining the ultimate soundness of concrete.

Benzol Supply in Germany.—According to the "Scientific American," in order to prevent the accumulation of benzol, or the manipulation of this product by the manufacturer so as to boost the price, the German Government has forbidden the manufacture of benzol to all persons in the Empire, with the following exceptions: Chemical factories engaged in the making of explosives or chemicals for the Government, and chemical factories which agree to turn over to the Government the entire amount of toluol produced during the manufacture of benzol. To make this latter order effective, every gallon of benzol offered to the German public for motor car use must be freed from toluol. The maximum amount of toluol permissible in benzol has been fixed at 1 per cent.; the Government realizing that in the course of forced production small quantities are liable to become mixed with the benzol.

THE CURRENT POSITION OF GAS TRADING.

By Samuel B. Chandler, of the South Suburban Gas Company.

[Presidential Address to the London and Southern District Junior Gas Association, Oct. 22.]

Gentlemen,—In opening my address this evening I desire to express my very earnest thanks to the Association for the honour which has fallen upon me in occupying the chair as your President for the session now commencing. I hope to prove a worthy successor to the able men who have previously held the position, upholding the aims and objects of the Association, assisted by an efficient and willing Council, and by the members good attendances at the various meetings and contributions to discussions upon papers and lectures which will in due course be presented before you.

THE GAS INDUSTRY AND THE NATIONAL CRISIS.

Never in its history—now more than a century old—has the gas industry been so closely connected with national affairs as at present. In the extraordinary times now being experienced by all classes, the enormously valuable service rendered the nation by gaseous fuel and bye-products is not, to those who stop a moment to think, difficult of realization. Coal—Nature's most splendid gift—dealt with as is the practice of our industry, is doing yeoman service in the present time of stress. From products essential in the manufacture of explosives, as fuel for all kinds and conditions of metal-working furnaces, in the production of disinfectants and medicines for field and hospital use, for cooking on extensive scales, and in multifarious other ways, the industry has come to the rescue in such manner as must materially assist in determining the grave issues at stake.

ELECTRICITY GENERATION AND RESIDUAL WASTE.

To the gas industry lies the credit of obtaining the utmost value from coal, and utilizing the gaseous and solid products to the best advantage; while, on the other hand, we have ample evidence that our electrical friends and others, by the prodigal waste of these residuals (assisting only to render the air in our towns less pleasant), due to the manner in which the raw material is dealt with, cannot contribute such national service, and with few exceptions continue wasting coal and destroying valuable constituents in a manner which is to be deplored, and, to my mind, is little short of criminal.

COKE FUEL.

When we consider the many valuable bye-products which pass away when coal is utilized as fuel for steam raising, heating, and many other purposes, and the resultant sooty exhalation, which assists in polluting the atmosphere and rendering futile the efforts of architects and builders to produce buildings which shall retain their beauty and newness, it seems somewhat strange that the practice should so long have been indulged in when coke is available—cleanly, of good calorific value, and easy to work with in properly-designed grates and fire-boxes; a form of fuel which is now becoming very popular, and which, while not wholly replacing the coal-fired boiler and domestic coal-grate, will yet go a very long way towards this (from our point of view) desirable end. It will, I am sure, be agreed that this method of heating, with its attendant advantages, has but to become well known to make it generally used for most purposes. The formation of the London Coke Committee must further this object to a very considerable extent, and, by its valuable work and propaganda, create a demand, maintain a steady market, and incidentally perhaps something approaching the good prices that have been the case with gas undertakings during the abnormal past year.

IMPROVEMENTS IN GAS APPLIANCES.

Improvements in appliances for lighting by gas have been most marked during the past few years, and inventors and manufacturers are to be commended for the acumen and ingenuity shown, which has tended to further the sales side of our industry. From the discovery by Welsbach, in 1885, of the effect upon non-luminous gas caused by certain rare metallic earths—although the idea of producing light by heating refractory bodies to the point of incandescence goes back to about 1826, when Drummond experimented with dense lime and an oxy-hydrogen blow-pipe, replacing the latter by discs of magnesia or zirconia; and in 1835 Talbot stated that "paper soaked in a solution of chloride of calcium and burnt in the flame of a spirit lamp leaves a white network of ashes, which, when held in the feeblest alcohol flame, emits a brilliant light" (the latter experiment containing the germ of incandescent gas lighting, and embodying the principles adopted in our own time)—to the discovery of a burner for use with gas under comparatively high pressure, from an illuminating efficiency of 2 candles per cubic foot of gas burned to one of 60, great progress has manifested itself. Nor can finality yet be said to have been reached; and we cannot foretell what the future has in store in this and other directions. So, too, with all other appliances for heating, power, and cooking, advance has been made in remarkable manner and the application of scientific principles involved in construction and design.

GAS-FIRE PERFECTION.

Perhaps the most notable and striking improvement has been in connection with gas-fires, and many firms have devoted a great deal of brains, time, and capital in evolving fires which shall pass successfully certain severe practical tests in order to demonstrate their ability to lead all products of combustion away through the flue-vents, even when unaided by flue draught; while at the same time no appreciable loss in thermal efficiency takes place. Recognizing the importance from a health standard, and appreciating the great boon such fires are to the public, their utility, convenience, and direct effect upon the purity of the atmosphere, medical authorities have interested themselves in this connection; and, as is generally known, one of the journals published on behalf of the medical profession, the "Lancet," has devised an interesting and novel test, bearing its name, which is simple, and requires no special apparatus to demonstrate. The "Shadowgraph" test for hygienic efficiency is also well known, and has, I believe, been adopted by some gas authorities.

One of the objections against gas-fires is that the air of the room does not undergo change so frequently as is the case with the coal-fire. Even this objection, which it appears to me has no place in the mind of the average consumer, has been catered for; and the installation of a gas-fire with double canopy—one section for flue products, the other for vitiated and contaminated air—meets this. It is claimed that ventilation and changes of air in rooms where this type is used are as regular and speedy as with the coal-fire; perfect ventilation being produced. Noisy gas-burners have been overcome; and it is very apparent we are able to-day, with complete confidence and belief, to recommend to all classes of consumers the adoption of modern gas-fires for any position (where flue outlets are provided) and in any circumstances.

From the old unhealthy, noisy, and inefficient fire—which spelt anathema to the user, reduced the water vapour and dried-up the air, gave rise to unpleasant conditions, and did no good to the industry—we have appliances which, besides being ornamental and fit for any room, are silent in operation, and will return in useful and comfortable warmth at least 75 per cent. of the heat energy introduced into them. Certain it is, supported as we are by medical, scientific, and professional authorities, and well knowing that this form of gas-consuming appliance is a creditable addition to the many in our hands, the future appears to be a bright one; and we can, I am sure, afford to be very optimistic in regard to the competition of electricity when introduced for general heating purposes—competition which is to be contended with, although I am of opinion we need not for some long time yet to come regard this form as a serious trade rival in this respect.

ELECTRIC HEATING AND COOKING.

There can be no tangible objection to modern gas-fires with efficiencies such as mentioned, and proved again and again, and the superior ventilating effect and advantage in running cost over the electric appliances. We must, however, remember that the electrical industry, like our own, is for ever experimenting, more especially in the direction of domestic heating and cooking, bringing the latter to such scientific lengths that if ever the ideal electric cooker does arrive, the next difficulty will be to find the cook to operate such a delicate and intricate appliance, which, to be successful commercially, must be constructed to stand the very hard wear and tear imposed by everyday use upon apparatus of this character. The claims made by the electrical industry in relation to heating and cooking are oft-times extravagant, and, dealt with by a capable man representing gas interests, should not be difficult to dispose of. It is not easy to imagine the time when electricity can ever successfully compete with gas for these special purposes, especially when one considers that from the actual thermal units generated about 7 cubic feet of average town's gas are equivalent in heat value to the expenditure of a Board of Trade unit, from which it would appear that current must be supplied at something like ¼d. per unit to ever compete with gas in point view of cost alone, which it will be agreed is certainly not the most important consideration.

THE GAS-COOKER.

The gas-cooker has never been so popular as at the present time, and it is the happy experience of gas undertakings to be able to report large increases in numbers put out from time to time. Scarcely any modern residence on our area of supply is without means of cooking by gas—indeed, it is quite exceptional for new houses to be without them, together with provision for gas-fires.

IMPORTANCE OF THE GOVERNOR.

The present conditions existing relative to lighting show an extensive adoption by the public of the inverted form of burner, having many advantages over the "C" type. In this connection, having regard to the fluctuations which are bound to occur in any line of main, comparable with voltage surges in electrical circuits, especially in those parts of a district where, owing to local conditions, the pressure varies considerably, it is very desirable that a governor of the pressure type be used, having an outlet pressure of something in the neighbourhood of 25-10ths. By this means regularity is assured, and the consumer can depend on evenness of illumination under all conditions. The tendency appears to be in the direction of higher pressures; and in view of this, I believe that at some future time it will be as much the business of gas undertakings to supply either an effectual governor, as part and parcel of the meter, or else a specially governed meter. This

cannot, of course, be accomplished without capital expenditure; and rent for an appliance of this character would, I suggest, have to be included with hire terms existing in connection with the meter. The need has already been recognized by some undertakings, and governors are installed in many instances. But to be of adequate service to the consumer, steps should be taken to make the practice far more general than it now is.

For some time, as is well known, burners have been upon the market with fixed gas injectors and air-ports. This is a decided step in the right direction. But, at the same time, I venture the opinion that, in order to obtain maximum efficiency, especially in these cases, a governor should be used in conjunction with such burners. Consumers, in trying to adjust burners without any idea as to the effect alteration of mixture may have upon them, do not usually obtain good results, and are likely to blame the gas itself rather than their interference with the medium through which it is used. When dealing, as we do, with the general public, we must keep before us simplicity as the ruling idea; adequate supply, the "fixed burner," maintenance, and governed pressure forming ideal conditions towards this end.

THE CHEAP BURNER NUISANCE.

The industry has suffered long enough from the cheap burner—a product dumped here in the first instance by the Teuton. I think I am right when I say no respectable gas undertaking will uphold the sale of such rubbish, and its adoption by consumers should be prevented by every means possible. Whatever lighting appliance is introduced, let it be one of merit, good and lasting quality, and a producer of creditable results when in use.

MAINTENANCE.

The question of up-keep of burners is important; and its value is not to be over-estimated. When, after a struggle against keen competition, a gas lighting installation is obtained and no question of maintenance crops up, it is very disappointing, upon calling at the premises some time later, to find that the burners and glassware have had no attention—consequently being neither efficient nor pleasant to look upon. This is a serious matter, and in cases where it exists does much to belittle the undoubted superiority of gas lighting over any other form of illumination in the minds of the users. It is no advertisement, and is, indeed, likely to prove a factor in losing business. In all cases special efforts should be made by the gas official to obtain instructions for maintenance when an order for fittings is obtained. By this means, and subject to a skilled man being employed, one may be assured that any lighting installation will remain quite satisfactory and give no cause for complaint. The consumer is occasionally difficult to convince in this connection, appearing to think that once a burner is installed it will retain its cleanliness and efficiency *ad infinitum*. In cases where it is not possible to persuade him to adopt maintenance, it is wise to offer facilities for a free trial; so that, by practical demonstration, he may be led to allow the gas company to continue the service. On the other hand, although nothing is more simple to keep in order than an incandescent burner, he should be offered facilities for the tuition necessary, and have an opportunity of examining a burner and parts. Maintenance must be regarded as of the greatest consequence in determining the value of service rendered in the distribution of gas.

All appliances should be efficiently looked after in this respect—whether the property of the consumer or on hire. I do not think we can look to the consumer to pay much attention to fires, radiators, boilers, &c.; and although considerable expense is involved in carrying out a free maintenance (of all appliances) scheme, the outlay would be compensated for in large measure by the additional output which would accrue, due by reason of the satisfaction experienced by consumers in using appliances which efficiently do their duty and are always ready for use, and leading to extension by the further adoption of labour-saving gas consuming devices.

TRAINING THE GAS-FITTER.

At no time has so much attention been directed to the gas-fitter as the present, nor have so many opportunities previously been available for the acquisition of theoretical and practical knowledge. The industry is fully alive to the importance of this; and in conjunction with various educational bodies throughout the country, excellent facilities now exist for the organized training and equipping of this most important branch—one which has far-reaching effects; for by the quality of the work done resultant efficiency and practicability are effected, and consumers tend to be influenced to a great extent by the way in which their requirements are carried out.

It is common knowledge that the gas-fitter of yesterday, unless he takes advantage of the opportunity, cannot hope or expect to keep pace with the younger generation springing up. The day when work could be done haphazard, "take it or leave it," has long since passed, besides which the requirements of modern gas work are far more comprehensive than those existent some years ago. I believe the average fitter recognizes this; and now that practical tests, followed by examination, have been established, one hopes to see, and indeed anticipates, a very keen interest and application in the future. Every encouragement is offered; and if a man does not realize this, it is his own fault should he drop behind, as undoubtedly he will.

Good progress in the scientific application of gaseous fuel has been made, and with it appliances of a more or less intricate character evolved. The production of hot water by means of gas is comparatively new, and will increase in importance as time goes on. High-pressure lighting and heating, modern burners, fires, geysers, and the hundred-and-one smaller appliances designed for use in the domestic and factory spheres, all represent some special train of thought on the part of their designers, and, accordingly, to produce the desired results must be understood and fitted in the correct way. An up-to-date fitter, to rank "first-class," must of necessity be *au fait* with the use, design, and capabilities of modern apparatus. The laying of supplies and the fixing of fittings and appliances, the correct sizes of pipes to instal, and so on, may be easily understood; but of what advantage is this if, when an apparatus is installed, the fitter is unable to correctly adjust or explain it?

In thus remarking upon the practical man, mention should be made of the gas official—canvasser, inspector, or foreman. He is usually in charge of, or responsible for, the carrying out of work; and it is absolutely essential that he keeps himself up to date and have a clear conception of the advantages and limitations of all new devices. In contact with the consumer, he acts in an advisory capacity, and in most instances his word is taken regarding the capability, use, advantage, and economy of the particular appliance in view and the desirability of adoption. He must therefore know these things—and not only from a theoretical, but also, whenever possible, from a practical standpoint. As with other branches of the industry, classes, lectures, and demonstrations are open to him, and should be taken full advantage of.

PRACTICAL DEMONSTRATIONS AND ENCOURAGEMENT.

In conjunction with these, I would suggest, for the consideration of those interested, the formation of a permanent exhibition on the works of an undertaking large enough to warrant it, open to employees only, in which every piece of apparatus adopted for sale or hire by the particular company is placed on show (preferably in section) for a time, and periodical meetings of distribution officials, foremen, and fitters held, under the direction of a thoroughly practical member of the staff who is in a position to dilate upon the merits of the appliances exhibited, explain the special features and methods of fixing, and invite questions and discussion thereon. The cost of such a scheme would be trifling, the co-operation of makers unquestioned, and great benefit would accrue, not only to the undertaking itself, but to the staff generally, and certainly in the long run to the consumer.

I regard the present time as a splendid opportunity for the fitter; and he seems to be "coming into his own." It is, however, the duty of those in control to encourage him to better himself; and the chief who does not use his best efforts to persuade those under him to further increase their knowledge, and, by advice, assist to this end, is not contributing his best service to the company he represents. The mere fact that a man holds one position to-day is no criterion that he will not occupy a more responsible one to-morrow—indeed, the industry is in need of men who show, by sheer merit and application of purpose, the desire to do better in their respective spheres. I believe the technical men of the future will be largely drawn from those fitters who are wise enough to realize the opportunities which are now before them. With the growth of the industry and the expansion of the uses to which gas is now put, and the competition of other forms of energy, the institution of special departments has become most necessary to deal in a proper manner with the many intricate questions arising in the sale of gas. Administrators have long recognized that it is one thing to make gas, but quite another to sell it; and while the manufacture of good gas forms the foundation upon which the reputation of the industry is maintained, it cannot be gainsaid that it is from the ever-expanding increase in output that dividends are made.

PUSHING SALES.

Special attention must therefore be given to means whereby such outlet may be extended. The formation of canvassing and sales sections, having at their heads specially trained commercial men, staffed with capable and trustworthy officials, has assisted to place the industry in a sound position, and, while creating the demand, caters for the needs of all classes of consumer, bringing home the advantages of the use of gas for all purposes—industrial and domestic. Advertising through the Press is excellent in its way; but to effectually reach the consumer there is absolutely nothing to come up to the personal call. An engaging manner, expert knowledge of the subject, and a desire to satisfy, do more than reams of pamphlets and circulars, which I very much fear generally find their way into the waste-paper basket. The personal element is essential; and its value is not to be equalled by any other means.

GAS-HEATED HOT-WATER SUPPLY.

In connection with expanding sales of gas, new fields for which are ever opening up, an excellent opportunity is found in areas—and there are many—where, by reason of added railway and tram facilities, the large old-fashioned houses are converted into flats, catering for the smaller consumer. In these instances it is found that, by such conversions, three or four consumers are placed on the books of a gas undertaking where only one used to be registered. A special outlet for gas consuming appliances is thereby created, and chance given to introduce, among other things, especially the gas-heated boiler or "circulator." It is, however, advisable that all gas consuming appliances of this character should be automatically controlled—the consumer being

thereby relieved of the necessity for special attention, and the chance of an unduly high gas account very much minimized.

We have only touched the fringe of gas-heated hot-water supply; and provided always special attention is given to each and every installation—so producing satisfactory conditions, economy in running cost, and convenience in use—there is no reason why this comparatively new outlet for gas should not prove of great and increasing value to all progressive undertakings. Certain it is that, provided the special attention to which I have referred is devoted to this branch, installations of gas-heated boilers will, in common with all other appliances giving satisfactory service, advertise themselves. A consumer who is perfectly contented with any apparatus of domestic utility which is labour-saving and bears out in a practical manner all that is claimed for it, does not hesitate to expound upon its merits to his friends, with the result that, in many instances, an inquiry is received by the gas department, which, being followed up, makes another consumer.

There is, of course, another side to the question relating to ill-fitted and inefficient appliances, upon which it will serve no good purpose to dwell; my only idea being to draw attention to the need for specialization and for inquiry into each individual case. Hot water departments are becoming general among gas undertakings, and must increase in importance as time goes on. Where, by reason of some special circumstance, it is found inadvisable to introduce a gas-heated water system, the consumer should be frankly and diplomatically dealt with, and an endeavour made to persuade him to adopt a coke-consuming appliance, thereby retaining him as a customer for this class of fuel.

THE POSITION OF THE COLLECTOR.

It has been suggested more than once that the collector should assist in pushing the sale of gas in the course of his everyday employment, and, in fact, become what is to all intents and purposes a canvasser for his company. While, however, recognizing the fact that at all times a word in season from any official of an undertaking is of value, and may lead to business—and this should always be borne in mind—it does not seem to me possible that the collector is able to devote any time at all to discussing such matters with consumers. The collector has enough to do with the business on hand; and should he be called upon to add any further responsibilities to his ordinary duties, something would have to suffer. I would rather suggest that, coming into personal touch with practically all consumers on the books of an undertaking, and having exceptional opportunity for conversation, he should be instructed and expected not to advise, but to make a note of any particular request or query set up, and refer it to the department whose business it is to deal with such matters, and, indeed, regard this as part of his duty.

Considerable work is imposed upon the collector, and although in many instances accounts are paid at the local show-rooms (a very desirable proceeding), he has quite enough to do, and should be left to do it rather than asked to take up matters requiring special knowledge and experience. A speaker at a recent meeting gave as his opinion that the collector should be gradually eliminated; the collection of accounts not being necessary, due to the habit of paying into show-rooms. This appears, however, hardly feasible; for, after all, there are many queries and questions raised which only the personal call can settle, and it is not to be expected that all consumers will visit offices to pay accounts, although encouragement should be given them so to do in view of interest becoming aroused and the existence of new appliances pointed out.

MEETING ELECTRICAL COMPETITION.

It would be futile not to recognize that competition between all forms of heat energy will become more acute as time progresses; and it is therefore imperative that we should put our shoulders to the wheel, and, realizing that greater knowledge and application are demanded of us, seek to obtain it by every means in our power in order to successfully cope with new conditions that from time to time may arise. It is not sufficient to know all about one's own profession or trade; for, without some knowledge at least of the practice of competitors, one is at a discount and not able to contribute service of the greatest value. The study of the *pro* as well as the *con* must produce a convincing manner, and in contact with the consumer or customer greatly assist in effecting the desired end.

Especially is this so regarding gas and electricity—two forms of energy which are productive of like results, and between which, from the point of view of the general public, influenced there is no doubt largely by advertisement, but little difference appears to exist. In practice, however, great differences do exist, as we well know, and not from the standpoint of running cost alone. It is the business of those engaged in outdoor departments to bring out, and place before potential consumers, the relative values, ultimately securing them to ourselves for lighting, heating, cooking, or power. We are in a position to go to the consumer and say: "Adopt our form of energy and whatever you use you pay for, and nothing more." On the other hand, it is, I believe, somewhat common practice for electrical undertakings to obtain signatures to agreements for fixed sums per quarter whether current is dissipated or not. This appears to be a most unsatisfactory method of doing business.

The electrical industry is also burdened by a large number of special rates. To mention but a few, we have: Maximum demand, rateable value, contract demand, Metropolitan, telephone, differential rate, Glasgow, and others, all of which must at times create some confusion, nor be always satisfactory to seller and buyer Flat-rate per unit, based on consumption of current only, appears to be, from a consumer's standpoint, the only correct one, although, of course, the electrical supplier has good reason to think otherwise. In our capacity as technical representatives, we should have some knowledge of matters of this character, and also be thoroughly conversant with the nomenclature common to the industry. At a future time I may be privileged to further explain in detail such rates.

EFFICIENCY.

Before concluding, I should like to make a few remarks upon a subject which is, I am afraid, becoming a little well worn, having especially engaged the attention of a number of gentlemen who appear to think that most industries in this country are suffering from lack of organization and correct business methods, known under the name of "efficiency." It will be agreed that to produce a sound state of affairs in any undertaking of public service, it is a *sine quâ non* that all departments inside and out should be coherent and act together as a whole. The labour of any one section is to a large extent nullified or reduced in value if these conditions do not exist. Efforts must be made by those in authority to effect smoothness of working and unity of purpose; and in addressing a body of men some of whom already occupy positions of responsibility, and others who will in due course control departments of importance, I venture the opinion that the development of character, a kindly and tolerant manner, and sympathetic treatment exercised towards those with whom we come into contact in our various spheres are of inestimable value to those whose representatives we are, and tend in great measure to produce a high degree of satisfaction and efficient results. I am afraid we sometimes take little heed of the psychological aspect of business life; but it is a powerful factor in determining a man's fitness for the position he may occupy, apart from consideration of the knowledge required. After all, "The mind's the standard of the man," and the reflection of his character in those around him is a measure of his worth.

VALUE OF THE JUNIOR ASSOCIATIONS.

The Junior Associations occupy to-day an excellent position, and have, indeed, become an important feature in the gas industry, encouraging the younger members of the profession to come forward and give of their best for the common good. It will I am sure be agreed that many advantages accrue from membership—the reading of papers, engaging in discussions, lectures, and visits to the many interesting works and factories thrown open with such great liberality by managers and manufacturers (often at considerable inconvenience to themselves), embracing as they do all the branches of the gas and kindred industries, serve an extremely valuable purpose in broadening the views of the members, and, coupled with earnest attention to their everyday work, fit them for higher and more responsible positions, and assist towards a realization of their ideals.

GAS MANUFACTURE AND HIGH-PRESSURE DISTRIBUTION FOR SMALL TOWNS.

THE TENNEY PROCESS.

By Ralph B. Wagner.

[A Paper read at the Twenty-Fourth Annual Meeting of the Michigan Gas Association, Detroit, Sept. 23.]

The Tenney process is designed especially for supplying gas to small towns, either isolated or in conjunction with other small towns connected by high-pressure mains to the one manufacturing plant. It is chiefly applicable to towns where the cost of the ordinary systems of coal or water gas manufacture and low-pressure distribution would be prohibitive—in fact, the largest community at present supplied with gas by a Tenney plant has a population not exceeding 15,000 people. Tenney plants are designed to economize in both installation cost and in operating expense. They were first installed in the smaller towns throughout Iowa and Nebraska. Because this particular process differs in many interesting details from the systems generally employed in the gas plants throughout Michigan, it was thought a brief account of the process would be interesting to members of the Association.

The term "Tenney Process" in its strictest sense should only be applied to Mr. Tenney's process of manufacture of gas, as the high-pressure storage and distribution principles employed by him are to-day commonly used by a majority of all newly-constructed gas companies, regardless of their process of manufacture. A brief description of the high-pressure storage and distribution methods employed by Mr. Tenney will not be out of place, however, as he (possibly more than any other one man) has experimented with, and brought out the merits of, high-pressure storage and distribution.

Manufacture.

The Tenney process of gas manufacture is a system of carburetted water-gas manufacture, identical in principle and gas composition with the Lowe system. Instead of having the generator, carburettor, and superheater in separate shells, however, the

Tenney system combines all these stages in one shell. This shell is rectangular in shape, 16 feet long, 5 feet wide, and 12 feet high. It is built of ¼-inch steel, lined with fire-brick. A 60 H.P. waste-heat boiler, placed on top of this shell, constitutes the cover of the generator proper. Heavy fire-clay tile protects the belly of the boiler against the excessive heat of the generator. All blast gases and carburetted water gas leaving the superheater pass out and through the fire tubes of the waste-heat boiler. Thus the boiler acts as a primary condenser to the water gas; and it is claimed that an economy is effected, due to the fact that no shock is given the gas by plunging it into the water of the hydraulic seal without first reducing its high temperatures. Enough heat is generated in this way to operate the blower for the generating apparatus, and also to drive a 50 H.P. duplex, cross-compound gas-compressor. The exhaust steam from the compressor can, by turning a three-way valve, be run into the superheater. In this way the apparatus can be operated without drawing to any considerable extent on the live steam from the boiler. An additional fire-box placed at the back end of the shell supplies the necessary steam to drive the blower while the machine is being warmed-up.

The piping to the oil-storage tank is so arranged that the pressure in the gas-storage tanks can also be transmitted to the oil-storage tank, and this gas pressure forces the oil into the enriching chamber.

Similarly to the Lowe process, in the Tenney system the gas empties directly from the generator into a relief holder; and from this point, the gas is drawn by the suction of the compressor through the scrubber, washer, and purifiers, and is then compressed into the high-pressure storage tanks.

In designing the scrubbing, washing, and purification apparatus and pipe-line, provision is made so that all this apparatus can be used in connection with coal-gas benches; so that if the price of oil becomes prohibitive, the entire plant can be made into a high-pressure coal-gas plant by the addition of coal-gas benches.

Pressure gauges are placed on a gauge-board to record the pressure on each storage tank; and a recording time gauge is placed in each office to show the pressure on the mains through every hour of the day.

The results achieved from the Tenney process of manufacture are very satisfactory. To make and compress 1000 cubic feet of 600 B.Th.U. gas requires an average of 4 gallons of gas oil and 50 lbs. of combined generator and boiler fuel. In the latest Tenney plant an automatic charging device is being used. With this device one operator is sufficient to operate a plant supplying a town of 4000 people. At night the plant is closed and locked up, so that only one shift is required.

Storage.

Whenever a complete Tenney plant is installed, high-pressure storage tanks are used entirely for gas storage. These tanks are 8 feet in diameter, approximately 40 feet long, and are built of $\frac{5}{16}$ and ½ inch steel. The gas is stored in these tanks under pressure varying from several pounds above atmospheric pressure to 80 lbs. and even 90 lbs. per square inch.

The pressure causes a precipitation of the moisture in the gas, and also precipitates the lighter hydrocarbon gases. These latter form an extremely explosive liquid, commonly called "bug-juice" by the operators of Tenney plants. A container is buried beside the storage tanks for the purpose of draining the water and this explosive liquid from the storage tanks. The water settles to the bottom of the container, and is drawn off from time to time; while the explosive liquid is allowed to accumulate until it backs-up into the storage tanks, where it is drawn through the governors out into the mains by the outgoing gas. In the mains, where the pressure is usually about 2 lbs., the gas, because of the released pressure, has the capacity of re-absorbing this explosive liquid. In this way, the gas loses very little of its high heat constituents, but loses its water vapour entirely.

These high-pressure storage tanks have a capacity of approximately 10,000 cubic feet, under a pressure of 80 lbs. per square inch. Where a storage capacity of 100,000 cubic feet is desired, ten of these tanks are ranged in parallel, side by side, on concrete piers. Two systems of valves are so arranged that all the tanks can receive or give out gas at the same time, or any one or several tanks can be cut off from the remaining tanks.

The pressure is reduced by two systems of governors. The first governor reduces the pressure from the storage tank pressure to 10 lbs., and the second governor reduces it from 10 to 2 lbs., which is the pressure commonly carried on the mains.

This is not a discussion of the relative merits of high and low pressure storage; but, in connection with the above description, the following advantages of high-pressure storage in small plants may be enumerated.

1. High-pressure storage tanks having a capacity of 10,000 cubic feet each under a pressure of 80 lbs. can be installed in place for a cost not to exceed $750 per tank; so that for storage capacities of less than 150,000 cubic feet, the initial cost of high-pressure storage is considerably less than that of low-pressure storage of the same capacity. In addition, if waste-heat boilers are employed, as in the Tenney process, the cost of compression is almost *nil*, and the above becomes a distinct advantage.

2. The extreme flexibility of the storage unit when high-pressure storage tanks are used is a distinct advantage. In a small plant, it is very common to instal at first a holder of 40,000 or 50,000 cubic feet capacity. If the town grows, or if the business develops more than normally, it is necessary to build another large holder. On the other hand, with high-pressure storage tanks the storage capacity can be increased by units of 10,000 cubic feet each.

3. The depreciation on high-pressure storage tanks is almost negligible—the life of these tanks being practically indefinite.

High-Pressure Distribution.

The Tenney method of high-pressure distribution differs in no marked degree from most other high-pressure distribution systems now extant. Standard black pipe, tested to 1200 lbs. pressure, is used for the mains. The sizes of pipe used are usually 3-inch, 2-inch, and 1½-inch. Where fifteen miles of pipe are required to pipe a town, approximately three miles of 3-inch pipe, seven miles of 2-inch pipe, and five miles of 1½-inch pipe are used—making the average cost of piping a town equal to piping the entire town with 2-inch pipe.

All fittings used at street intersections—such as crosses, elbows, and tees—are "Dresser" expansion fittings with rubber gaskets. In high-pressure transmission lines connecting two or more communities, where the pressure exceeds 10 lbs., lead-tipped gaskets are used in all expansion fittings. In long stretches of pipe line, a "Dresser" coupling is used every 1000 feet, providing that no other expansion fitting has been used in this distance. Recessed couplings, with a coating of red lead, are used in connecting all the pipes.

Every joint is subjected to an air test of at least 50 lbs., even though the line is not expected to carry more than 5 lbs. gas pressure. "Drips" are placed in all low places in the pipe line, to remove water that might accidentally get lodged in the line.

The pipe is laid at an average depth of 30 inches below the surface; this being found deep enough to protect the pipe from traffic above. Where there is no likelihood of the service-pipes being disturbed, they are often laid just below grass-roots. Service-pipes are often run on the outside of brick walls in order to reach upstair offices. In the winter these pipes are often covered with ice and snow; but, owing to the extreme dryness of the gas, a "freeze-up" is almost unknown. Service-pipes of ¾-inch are used almost altogether.

In laying these high-pressure distribution systems it is very seldom indeed that a pavement is disturbed. Whenever it is necessary to cross a pavement the pipe is pushed underneath the path by means of a pushing-jack. Pipe can be pushed successfully in this way for a distance of 200 feet. Wherever possible the pipes are laid in alleys, or if there are no alleys they are laid in the parkings on either side of the pavement, rather than tear up the pavement.

In connecting small towns of 3000 or 4000 population a 2-inch line is used as a transmitting line; the gas being forced through at a pressure varying from 20 lbs. to 70 lbs. At the town to be supplied, storage tanks and governors are placed to store the gas, and reduce the pressure in the same way as at the main plant. These storage tanks are provided with check-valves, so that if a break should occur in the cross-country pipe line, the gas cannot leave the storage tanks. This is an important point in the promotion of good service for small communities supplied from one central supply station.

The chief advantages of high-pressure distribution are: 1. The very low installation cost—the average cost of the pipe line, laid and completed, being less than $1000 per mile. 2. A constant, uniform pressure at every house, whether situated 100 feet from the gas plant or located 10 miles distant from the plant. 3. Immunity from "freeze-ups" during the winter months. 4. A very clean and dry gas that gives the best of satisfaction for both cooking and lighting. 5. The possibility of using gas under practically any pressure that may be required for industrial appliances, high-pressure lighting, &c.

NATIONAL ILLUMINATION COMMITTEE OF GREAT BRITAIN.

Affiliated to the International Commission on Illumination.

A Meeting of the National Illumination Committee of Great Britain was held at the Institution of Electrical Engineers last Wednesday, when it was reported that Mr. Jacques Abady had been nominated by the Institution of Gas Engineers as a member of the Committee to fill the vacancy caused by the death of Mr. Edward Allen, of Liverpool. The Committee elected Mr. W. Duddell to be its Chairman, in succession to the late Mr. Allen, and Mr. John Bond, of Southport, to succeed Mr. Duddell as one of the Vice-Chairmen.

Reports on observations carried out at the instance of the Committee at a number of technical laboratories, on the height to which the flame of the Hefner amyl-acetate lamp should be raised to afford a light of one International or English standard candle, were discussed, and their further consideration was postponed until fuller details of some of the observations and other records which had been promised had been obtained.

A report prepared and sent by Dr. E. Ott, of Zürich, on researches which had been carried out in Switzerland on the effect of atmospheric pressure, humidity, and vitiation on the light afforded by the Hefner standard lamp, was considered; and it

was decided (subject to Dr. Ott's consent being obtained) to prepare a translation of the report for communication to the English Technical Press.

As a result of the alterations noted above in the *personnel* of the Committee, the following is the complete list.

Chairman:
W. DUDDELL.

Vice-Chairmen:
JOHN BOND and A. P. TROTTER.

Secretary and Treasurer:
W. J. A. BUTTERFIELD.

Committee:

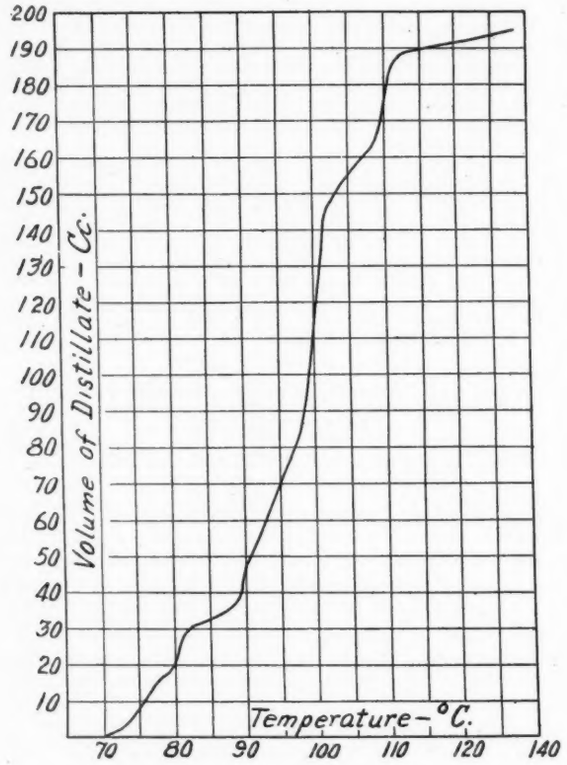
JACQUES ABADY (*c*).
FRANK BAILEY (*b*).
JOHN BOND (*c*).
W. J. A. BUTTERFIELD (*c*).
HAROLD G. COLMAN (*c*).
W. DUDDELL (*b*).
KENELM EDGCUMBE (*b*).
LEON GASTER (*a*).
R. T. GLAZEBROOK, C.B. (*d*).
F. W. GOODENOUGH (*a*).
HAYDN T. HARRISON (*b*).
JAMES KERR (*a*).
J. T. MORRIS (*b*).
CLIFFORD C. PATERSON (*d*).
SILVANUS P. THOMPSON (*a*).
A. P. TROTTER (*a*).
ROBERT WATSON (*c*).

(*a*) Nominated by the Illuminating Engineering Society.
(*b*) ,, ,, Institution of Electrical Engineers.
(*c*) ,, ,, Institution of Gas Engineers.
(*d*) ,, ,, National Physical Laboratory.

Representatives of Great Britain on the Executive Committee of the International Commission on Illumination:
HAROLD G. COLMAN and W. DUDDELL.

CONDENSATION FROM CARBURETTED WATER GAS.

Writing to the "Journal of Industrial and Engineering Chemistry"—the organ of the American Chemical Society—Mr. E. T. Sterne, of the Gordon Hall of Chemistry, Kingston, Ontario, gives some particulars of an examination he made of a sample of a condensate which was formed during a very cold winter several years ago in the service pipes of the local gas-works. The liquid was of a pale amber colour, with rather a sharp odour, and a specific gravity of ·740. The plant manufactures carburetted water gas, using anthracite coal in the generator, and Pennsylvania crude petroleum in the carburettor.



The liquid proved to be composed of low-boiling point compounds—95 per cent. distilling below 120° C., and 99 per cent. below 130° C. The sample was fractionated carefully in order to locate individual compounds in substantial amounts, which would make their presence known by irregularities in a curve plotted from the results.

The fractionation was made using a twelve-pear still head, and collecting the distillate in 2° fractions. The accompanying curve shows the boiling point to rise very regularly with the exception of breaks at 80° to 82°, 98° to 100°, and 110° to 112°. In order to obtain an idea of the relative amount of unsaturated hydrocarbons in the different fractions, the bromine absorption was determined in the combined distillate for each 10°. Excess of a $N/10$ solution of bromine in carbon bisulphide was allowed to react in the dark on 1 cc. of each of the undermentioned fractions for fifteen minutes. The excess of bromine was titrated with $N/10$ sodium thiosulphate.

Fractions.	G. Br. Absorbed by 1 cc.	Fractions.	G. Br. Absorbed by 1 cc.
70–80°	0·00950	110–120°	0·00820
80–90°	0·00930	120–130°	0·01580
90–100°	0·00875		
100–108°	0·00827	Original	0·0114

If it is assumed that the unsaturated is due to dodecylene boiling at 96°, the percentage of unsaturation is

$$11{\cdot}4 = 168/160 \times 1/740 = 1{\cdot}62 \text{ per cent.}$$

The fraction boiling at 108° to 112° was redistilled, and 1 cc. of that which came over at 111° was nitrated and toluene identified. The whole fraction 108° to 112° compared very well with commercial toluene.

The paraffins and olefines were estimated by using dimethyl sulphate, which gave 77·5 per cent. of paraffins and olefines undissolved. The composition of the sample works out thus:

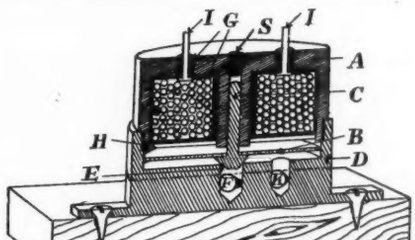
Paraffins.	Olefines.	Aromatic.	Total per Cent.
75·88	1·62	22·5	99·90

The quantity distilling at 78° to 82° was about 12 per cent., corresponding to benzene mainly; that at 108° to 112° (corresponding to commercial toluene) being about 10 per cent.

The above results led the author to conclude that the possibility of producing toluene on a commercial scale during the manufacture of carburetted water gas may be not unreasonable. It would probably involve some method of condensing or absorbing the toluene along with the benzene and other compounds, and the subsequent separation of these compounds—retaining the toluene and returning the others for illuminating and heating purposes.

ELECTRICALLY OPERATED GAS-STOVE VALVE.

The October issue of the "Journal of Industrial and Engineering Chemistry," publishes a description received from Mr. Zeno Ostenberg, of San Francisco, of a simple electrically operating gas-valve used to regulate the flame of a double-burner gas-stove, which heated a large water-bath, 24 inches in diameter. Since two of the appliances have been in operation for over a year-and-a-half, with entire success, it was thought that a description and illustration of the mechanism would be useful to others.



The mechanism consists essentially of an "ironclad" electromagnet A, which lifts the iron disc B to which are attached the brass valve and stem C. This makes a gas-tight fit with the main brass body D at the inlet E when no current is passing through the magnet-winding. But when current is sent through, the disc B and valve C are raised; and thus gas is allowed to pass from E to K, which leads to the burner. F is the outlet to a pilot light. The disc B is prevented from sticking to the magnet by the plug S, which may be screwed down to limit the travel of the valve-stem C. G is insulation, which must be able to withstand a rise of temperature up to about 100°, as the magnet sometimes becomes quite hot. The disc H is of brass, and is soldered gas-tight to the magnet to prevent moisture and gas from attacking the wiring and also to keep the wiring in place. The gas inlet tube [not shown] enters opposite to the pilot opening F. When operating from a 110-volt line, the winding consists of No. 26 copper wire with a 16-candle power carbon lamp in series. This allows slightly less than 0·5 ampère to pass the electromagnet.

The electrical circuit is opened and closed by a 75 ohm standard Pony relay, which is operated by a dry battery and thermo-regulator. The dry batteries, which were originally put into the thermo-regulator circuits over a year-and-half ago, are still able to operate the relays, as only about 0·02 ampère is used; and this amount of current is so small that no trouble whatever has been experienced from oxidation of the mercury at the contacts in the thermo-regulators.

Obviously the valve may be used on any size of burner, from the smallest micro-bunsen to one which has a gas inlet equal in size to the inlet and outlet of the valve. In the valves in use, these holes are 0·25 inch in diameter.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

Opening of the Session.

The session of the Scottish Junior Gas Association (Western District) was opened on Saturday last, in the Royal Technical College, Glasgow. In the absence of Mr. Thomas Carmichael, the retiring President, Mr. JOHN WILSON, of Falkirk, presided.

INSTALLATION OF THE NEW PRESIDENT.

The INTERIM HON. SECRETARY, Mr. Littlejohn, read a letter from Mr. Carmichael, expressing regret at his inability to come North.

The CHAIRMAN said that Mr. David Fulton, their new President, needed no introduction. He had been an official among them for so many years that if they did not know him it was entirely their own fault. He now occupied a recognized position in the gas profession, and he thought they ought to congratulate him on his keeping up his connection with the Juniors, as those who had gone before had not always done.

The PRESIDENT (Mr. David Fulton), having been duly installed, remarked that it said very much for the vitality of the Association that they had been able to prepare a syllabus in a year like the present. They had been able to secure Professor Arthur Smithells, of Leeds, to deliver their annual lecture. Mr. Fulton then read the following

PRESIDENTIAL ADDRESS.

Gentlemen,—I have to thank you for the honour you have conferred on me by electing me your President. Though perhaps I am no longer technically a Junior, I am indeed proud to be the President of this Association, for I feel that whatever slight success I have achieved has been in no small measure due to the educative and inspiring influence of the Association.

The Association is now entering its twelfth session; and it must be said that its success has far exceeded the fondest hopes of its sponsors. It might have been thought that through time there would have been produced a sterility of new ideas for papers; but the contrary seems to be the case, as the quality of the papers has been well maintained. A very valuable aspect of these Associations is the opportunities which the members have of informal chats regarding their troubles and difficulties with others having special experience. I cannot conceive how any young man with one spark of ambition in his composition can be so blind to his own interests as to remain outside the ranks.

Though the time is not propitious, I should like to refer here to one of the objects of the Association which so far has not matured—that is, the founding of a library. Through the kindness of the Royal Technical College authorities, the members can have access to the College Library on the same conditions as College students. This privilege is not taken advantage of as it should be, possibly because the library contains few gas handbooks. A library under the ægis of the Association would perhaps be more accessible; and I venture to hope that the matter will not be lost sight of when happier times return.

When we parted at the early part of the summer, we hoped that before the opening meeting of the current session our forces would have emerged victorious from the most tremendous and terrible of all wars. However, we unfortunately find that, though great things have been accomplished, there is no hope of another winter campaign being avoided. I was somewhat doubtful as to the policy of holding our meetings; but the Council felt that those members whose path of duty lay at home would be glad of an opportunity of occasionally meeting in the usual way. Therefore, a somewhat restricted session was arranged. I know that the coming winter will be fraught with trouble, and it will not be easy for many of you to get away to attend these meetings. Nevertheless, I trust you will endeavour to be present as often as possible, and so help to preserve that life and enthusiasm so characteristic of the Association in the past.

THE ASSOCIATION'S ROLL OF HONOUR.

The Association "Roll of Honour" contains the names of 28 members serving with His Majesty's Forces. The number is very creditable to the Association, and these members are to be congratulated on having sacrificed everything to answer their country's call. One member has fallen on the field of conflict. Mr. John Craig was killed in France on Sept. 18. In communicating the news of his death to a friend, his officer said: "He was a good soldier." I do not know that any man could desire a finer epitaph. We sincerely regret the loss of a young life; but it is no small thing to have fought the good fight, and died in the cause of right. Mr. William Scott was wounded in France, but has now happily quite recovered from his wounds.

TRAINING GAS-FITTERS.

During the past three years or so much has been said and written regarding the training of gas-fitters; and action has followed talk, with the result that we have now in many towns a definite scheme for the practical and technical education of gas-fitters, and also a definite scheme of examination and certification. This undoubtedly is all for the profession's good, for the more the fitter knows of the scientific principles underlying the proper use of gas, and the purpose and application of the apparatus he is dealing with, the better is he able to assist in advancing the cause of our industry.

QUALIFYING FOR THE GAS PROFESSION.

The training of young men for the position of gas manager has also received spasmodic attention; but, unfortunately, no action has followed. And as it appears to me that the present system, or lack of system, is woefully haphazard, it is on this point, and on the certification of gas managers, that I wish to have a talk with you.

If the proper type of men required by the great and ever-increasing needs of our profession is to be brought forward, then it is necessary that some definite scheme of training and guidance in study should be instituted. It is in the early years of his career, when his brain is receptive and retentive, that the young man of fair education joining the gas profession as a career should receive that training and education which will form a firm foundation on which experience will surely build. It is bad, and against the interests of the profession, that young men desirous of increasing their knowledge should be allowed to drift, instead of being directed on a definite course.

Mr. Thomas Glover, the kindliest of men and least harsh of examiners, in his 1912 review of the City and Guilds examinations in Gas Engineering, commented on the number of candidates who presented themselves very inadequately prepared for the test, and suggested the institution of preliminary examinations in chemistry and mechanical engineering. Now this unpreparedness is not altogether the blame of the student; some blame must be apportioned to lack of guidance and educative facilities. Young men keen enough to desire the certificate would not present themselves without having devoted energy to gaining knowledge; and it is a pity that effort should be wasted because their training and studies are not directed on right lines.

At the very outset of his career, a young man should have a definite scheme of apprenticeship laid down for him to follow, so that he will acquire sound knowledge of the various branches of his industry, and not be compelled to pick up in a second-hand way knowledge of a department with which he will never come directly in contact. I do not say that none ever have these opportunities; but it is not so in the majority of cases. The courses of technical study should be arranged to coincide with the practical training received; and instead of beginning with classes in gas manufacture, the student would begin with the study of those allied sciences on which the science of gas manufacture is founded. A young man would then have the certainty that if he made full use of his opportunities he would, when his apprenticeship was finished, be qualified to take an assistant's or other subordinate responsible position in a gas-works, which in time would lead him to the desired goal.

The gas manager of to-day has to have, broadly speaking, knowledge of chemistry, engineering, and business methods, with which subjects his industry is bound up. A young man has therefore no time to waste in flitting about seeking where he may begin, and studying in a desultory fashion, with but the haziest ideas of his ultimate object. At the very beginning his course should be set and his studies directed on settled lines.

For the teaching of the technical subjects—chemistry, physics, and engineering—good technical schools exist in practically every district, and commercial subjects are taught in every evening school. So far as gas manufacture and gas supply classes are concerned, I think these subjects are taught in only two technical colleges in Scotland—Glasgow and Edinburgh; but the students to whom they are inaccessible may avail themselves of any of several good correspondence classes. The machinery is therefore at hand; what is wanted is the introduction of a systematic course of study, combined with less divisional and more general works' experience; for, after all, all the school study in the world is incomplete without correlative practical experience.

Referring to the only "Gas Manufacture" and "Gas Supply" classes accessible to the members of this Association—those of the Glasgow Royal Technical College—I think that it would be a great advantage if to the theoretical instruction received in the lecture room, practical demonstration in the laboratory could be added. The syllabus should also be arranged to conform more to the requirements of the City and Guilds examination; for meantime the City and Guilds certificate is the only one for which a student may try. I do not know if there is a representative of the gas profession on the College Board, but there certainly should be one to advise and assist in making these classes thoroughly useful to the students. Mr. J. B. Scott, in his excellent Presidential Address to the North British Association of Gas Managers, suggested the institution of a central laboratory where gas managers could have experimental work carried out. This object might be achieved by setting up such a laboratory in the Glasgow Technical College, and arranging to utilize it for the training of students.

In speaking of education, the great educative value of our technical journals cannot be left out. The gas profession is fortunate in its technical papers, which give week after week reports of papers and descriptions of new methods which increase our knowledge and keep us up to date. Some years ago, when taking correspondence classes, I found the technical journals of more value for reference than any text-book. The moral is obvious. It is not easy for the Juniors by themselves to remedy matters. Our Association can help by giving advice and assistance to young members in arranging their studies. Otherwise the task is really one for the Senior Associations; and we can only take every

available opportunity of bringing before them our sincere desire for improvement, and our wish to assist.

I have spoken of these matters because I have felt the need, and because, in a fairly lengthy official connection with this Association, I have come to share the aspirations of the members and to sympathize with them, and desire to help them in their strivings towards a fuller and deeper knowledge of the things which make up our profession.

EXAMINATIONS.

Coming, now, to my second head, we are on very debatable ground; and I do not expect that my views will meet with anything like unanimity. But examinations are a natural corollary of any scheme of education, and those who have taken advantage of their opportunities welcome the possibility of putting their acquired powers to the test. Mr. James MacLeod, of Greenock, one of our Past-Presidents, in a recent article, said that the Institution of Gas Engineers had failed in its duty in not formulating a proper scheme for the certification of gas managers.* I am in agreement with him that such a scheme would be to the benefit of the profession. At present the gas profession stands almost alone in that it does not give those having appointments to make a lead by testing and certifying the qualifications of men seeking to fill the position of managers.

There is, of course, the City and Guilds examinations approved by the Gas Institution; and I must admit that in recent years the certificate has not been so easy to get. The examination is, however, very incomplete; for, being only a written examination, it can be passed by the bookman with a good memory, even though his practical experience is negligible. It is not a sufficient test of a man's knowledge. That this is recognized is proved by the utterances from time to time of leaders in the profession. A thorough examination should be both written and oral, and should require a certain standard of knowledge in each of the subjects which form the composite examinations—"Gas Engineering" and "Gas Supply."

Let us consider the case of the mine manager, who must pass the Board of Trade examination before he is able to take up a position as mine manager. There are two certificates of competency—first and second class; and candidates sitting for the examination must be at least 23 years of age, and have practical experience in mining for not less than five years, or, if in possession of an approved diploma or degree, of not less than three years.

A candidate for a first-class certificate must possess such a knowledge of arithmetic, mathematics, physics (including electricity), chemistry, geology, and engineering science as will enable him to properly answer questions in the syllabus. The syllabus comprises: (1) Winning and working; (2) theory and practice of ventilation; (3) explosions in mines, underground fires and inundations, their causes and prevention; (4) machinery; (5) surveying, levelling, and drawing; (6) general management and mining legislation, all with their various sub-heads. For a second-class certificate the syllabus is very similar; but the questions are of a nature suitable for practical working miners.

The examination is in two parts, written and *vivâ voce*. In the latter, candidates are required to display a detailed knowledge of practical methods of mining in the division in which they are being examined. For a first or second class certificate, candidates must qualify in each of the subjects, and must obtain 40 per cent. of the maximum marks obtainable for each paper, 40 per cent. of the maximum marks for the oral examination, and 60 per cent. on the whole examination, to qualify.

It is an examination conducted on these lines by the Institution of Gas Engineers that is wanted. Such a certificate would hallmark a man's abilities, and have a corresponding value. The energies of the Institution would profitably be directed to so influencing opinion that no man could obtain a position as gas manager without gaining his certificate of competency. The result would surely be of great advantage to the status of the profession; for it would be protected against the possible inclusion of those having no real pretensions to holding the position of gas manager. I think, also, it could not fail to result in an increase in the emoluments offered; for the knowledge that a standard of qualification is set could not fail to influence the public mind in this direction. The ordinary man is very apt to think there is nothing in making gas; and we should attempt to eradicate this erroneous opinion.

There is also another point on which I think the certificate of competency would operate advantageously to the gas manager. It would help to protect him against unfair treatment by a council or board; for the Institution could hardly fail to recognize the necessity of protecting those to whom it had given its diploma. In fact, I do not think you can ever properly seek to protect the gas manager until you have certified his competency.

In concluding these remarks on examinations, I cannot do better than quote words used by Lord Palmerston in a speech on examinations: "A young man having selected a particular profession should devote the utmost vigour of his mind to qualify himself for it by acquiring the knowledge which is necessary for distinction in that line of life." That is the spirit which I hope and think actuates the minds of the members of this Association; and I am sure that the progress of our profession will find a corresponding progress in your intellectual faculties, and that whatever calls may eventually be made upon you, you will not be found wanting.

* See "JOURNAL," June 1, 1915, p. 502.

GAS-FIRES.

The following points are frankly introduced in order to evoke discussion.

Recent years have witnessed great improvements in the construction of gas-fires; and their efficiency and convenience have resulted in a very large increase in their use. But the addition of improvements in construction and efficiency year after year presents the gas manager with the problem of how best to supply them to the consumer in a manner advantageous to the user and to the gas undertaking. In Helensburgh, we let fires on hire at low rates; but my experience has not inclined me favourably to this method. There is the constant expense of changing fires; for whenever your consumer sees or hears of something new, he will have it. To-day a gas-fire need not be very old to be out of date; and it takes a courageous man, certainly not a thrifty Scot, to view with equanimity the scrapping of these fires. The problem of the fire which has been out and is returned is a little difficult, for letting them out on lower terms is not of any great service. There is also the consumer who fits gas-fires in the spare rooms which are only very occasionally used. One thinks of the initial cost of fire and fitting, and can only hope that when the fires are used they will so prove their convenience and utility that others will be speedily installed in the rooms which are used.

There is also another point which must receive consideration in deciding the policy which will guide the supplying of gas-fires. The consumption of gas by gas-fires being greatest when the ordinary load is greatest, large increase in their use naturally tends to reduce the reserve of carbonizing and other manufacturing plant; and an undertaking will eventually be involved in additional capital expenditure in providing extra plant. Altogether I am of opinion that gas-fires should be supplied to consumers on such terms as will make them pay for themselves, and not burden the gas rate. My own inclinations favour a hire-purchase system which will recover the cost in a period of at most three years.

SERVICE PIPES.

In a residential town like Helensburgh, a large number of the houses are placed at a very considerable distance from the line of street main; and accordingly service-pipes are costly to lay. There is an amount of inequity in laying these services free; for the man whose service-pipe is 150 yards long has a considerable advantage over the man whose service is only 10 yards long. Therefore it is our policy to charge time and material for all service-pipes laid inside the line of feu to the inlet of the meter. Previously we were content to recover cost. About two years ago, however, we had trouble on the matter with the local tradesmen, who complained of unfair competition; and since then we have been charging trade rates. This policy suits us quite well, though I am afraid that where there is competition with electricity a different policy would be necessary.

GAS HOT-WATER HEATERS.

There are now many excellent gas hot-water heaters on the market; and this summer we introduced them to our consumers on hire-purchase terms, with, for a beginning, pleasing success. There is, however, great need for a cheaper form of copper circulator; for the present rather high price militates against their general adoption. The cheaper circulators are made of cast iron; but these are unsuitable for our hot-water systems, where storage tanks and circulating pipes are of copper. There appears to be a form of electrolytic reaction between the iron and copper, which deleteriously affects the former.

DISCUSSION.

Mr. JAS. S. M'NICOL (Dawsholm) opened the discussion. He said there was no doubt but that there should be some clearly-defined path laid out which the student could start and follow up, and gain the position he desired—that of gas manager. At present they were allowed to muddle on, finding out when it was too late that they had started at the wrong end of the business. With reference to a library, there was no doubt they could do with one for the Association. Articles in the Technical Press were certainly of very great advantage to the student; but the drawback was that he could not get access to the gas journals and the "Transactions" of the Institution of Gas Engineers for past years. It would be a glorious opportunity for some of the Seniors who had gas journals and proceedings that they seldom or never looked at to present them to the Juniors. Mr. Fulton had remarked, in reference to the City and Guilds examinations, that Mr. Glover said the student came forward unprepared. This was true. But the examiners were sometimes to blame, as they put questions in a way that could not be understood.

Mr. JAMES M'GHEE (Glasgow) found himself in general agreement with Mr. Fulton on most points. The deficiency of being unprepared to which he had referred, and to which Mr. Glover had alluded, in many of the students, was reflected all along the line, even in the gas-fitting classes. With the experience he had had of checking papers and of examining, he was astounded at the lack of general information and of ability in some of the candidates to put their thoughts into English. Many of them in the local examinations failed to do themselves justice. In connection with one or two who did remarkably well in the gas-fitting classes, he found it might be attributed to the fact that these men were taking an interest in outside societies apart from their own trade.

Yet several of these men, as actual workmen, could not hold a candle to others who had let themselves down very badly. He put down much of the general deficiency to the lack of a properly-defined path. He considered it the duty of the seniors to help, and he trusted they might not think it presumptuous for the juniors to point out the way they should go. They did not appreciate the keenness existing nowadays to attain to the coveted positions. Many, however, did appreciate it, and showed, by their personal help, how they wished the young men to go forward. He considered it was a duty to lay down a definite curriculum. He had been in mining classes, and he remembered being astounded at the amount of work expected from the manager of a coal mine. He had formerly thought, with other people, that any one could fill the job. Assuming that a curriculum were laid down, he would say there was no necessity for it being under the ægis of the City and Guilds. There was the Herriot-Watt College in Edinburgh, and the Technical College in Glasgow. Certificates from them would be sufficient. He failed to see why a certificate from these colleges should not carry as much weight as one from the City and Guilds of London. He would say it was the duty of the North British Association to emphasize this point. Dealing with the allied courses, more stress might be laid on the commercial side of the subject. A great many men had had to gain this knowledge by hard experience. Earlier in their days, if they had had the knowledge which Mr. Fulton had dwelt on, they would have saved their companies many consulting fees. There had been instituted this year, for the first time, a practical class in connection with gas-fitters. Cylinders, tanks, and various types of hot-water circulating appliances were being installed. The students would be given these to fit up. These were being furnished along with many other appliances—gas-engines, high-pressure lamps were to be included in this practical course. They hoped that they would be able to draw upon the apprentice plumbers, and that they would be able to take the certificate in the fitting class.

The Hon. Secretary said that Mr. Fulton had voiced a matter which was engaging not only the gas industry, but practically every industry of the country. The gas industry occupied a peculiar position in the fact that it was not a large industry, compared with engineering and other allied industries. In contrast with Mr. Fulton, he held it was in the early years that a young man had no desire to learn anything. Most of the youths who went to technical classes were sent by their employers, who were far-sighted enough to think that a good training given to them meant money in their pockets later on. The boys went there, and unless one got a grip of them one would not get them to learn anything. He had once been asked to take a class of mining engineers. In the class there were 15 students, and only three of whom were younger men than himself. They had men in the class up to 45 years of age studying for the mine manager's certificate. If a man of 45 studied for this certificate, surely a man in the gas industry could likewise study. Who was to direct the student? The parents, unless they were in the gas industry, could not do so. The direction of the student must be wholly with the chief. As regards unpreparedness for the City and Guilds, it was quite understandable. To anyone who had experience of the teaching classes, it was remarkable the teachers they got. The remuneration now paid to teachers was not sufficient to draw the right men. The gas industry was small, and could not pay good sums to teachers. They had men teaching engineering who really were not engineers but ordinary teachers, and they used books which were not written by engineers. If they ever did get men who were connected with the gas profession, they were there because they could not make enough in the gas industry. It was always found that if one got a good man into the business, he made far more at his profession than he did at teaching. It was even claimed that the teaching was used more as an advertisement than anything else. It was undoubtedly the case that a scheme of apprenticeship should be laid down; but it would have to be interpreted upon a very wide basis. If boys went to evening classes, they must be allowed time to attend class and prepare for it. It was ridiculous to expect a youth while working to spend the whole of the winter studying and tearing his life and soul out to make himself better. In Germany, they did not believe much in examinations, especially written ones; they believed more in oral examinations. Personally he did not much believe in examinations at all. The whole point, however, was: Do gas managers want trained assistants? In other branches of industry, the leaders of industry did not want trained assistants. They were afraid of them.

Mr. A. H. Whitelaw (Glasgow) disagreed with Mr. Fulton's remark that to-day a gas-fire need not be very old to be out of date. He thought it would be a serious thing if this were so. He mentioned fires which had been on the market for ten or fifteen years which were as good to-day as when they were introduced. Coming to the frame fires, all the makers had brought them to a very high pitch of perfection. The burner was giving maximum efficiency. If fuel could be improved, so much the better; but it should always fit the same burner. The matter of ventilation had also been advanced. It would be a sad thing if the fires they had in the district just now had to be taken in because it was thought there was a better article on the market. He believed they were supplying the fires too cheaply. The people should put in the pipes themselves. Cookers were standardized; and the time had come when fires also should be standardized. As for gas water-heaters, one might have ten years of the classes Mr. Fulton had been referring to and know very little about the subject. It was a difficult subject, and one regarding which there was a great deal to learn. The makers promised 95 per cent. efficiency for a hot-water heater. He had carried out tests on most heaters on the market; and he thought one was very lucky to obtain 60 per cent. efficiency at the tap.

Mr. J. MacLeod (Greenock) said the isolated position of many gas undertakings rendered the problems raised by the President very difficult. Some form of examination was necessary to raise the status of the profession. He thought Mr. Fulton was quite right in saying that the right status that the gas engineer should have could only be attained when there was a general examination. It was to the younger men that they looked for advance. He had recently the opportunity of seeing the syllabus of the Birmingham Technical College. It was an excellent one, extending over five years for the training of the gas engineer. It could be adapted by the Glasgow Technical College without any difficulty. If any young man went right through this syllabus he would be trained very well indeed—at least, to the extent a man could be trained. Of course, no system of technical education could wholly train a man for his profession. Men were born with special aptitudes. But some form of systematized training was absolutely essential. He hoped that the Technical College would form a course, and that the College certificate, would be of high value to young gas engineers. He trusted when some of their young gas engineers had got placed, they would display extra energy to improve the status. Unfortunately, the Gas Institution was not improving the status of gas engineers, and improvement rested with the younger men. Mr. Fulton, he thought, was right regarding gas-fires. He would go further. It should be a limited purchase system. In the course of two or three years the fire should become the property of the consumer. He could not agree with Mr. Whitelaw that the fires did not get out of date, nor could one convince the ladies that they did not get out of date.

Mr. Thos. Frazer (Dalmarnock) supported the contentions of Mr. Fulton regarding the training of the student. He knew of cases where they got the credit of having more knowledge than they actually had, and where they were so ashamed of themselves that they would not go among the young men to learn what they ought to know. Wherever there was any public money at stake, the man who was to rule the affairs of the company or corporation ought to have a certificate of merit of some kind to show that he had qualifications. The Association to which he might belong would then be in a position to protect him.

Mr. Alex. Wilson (Glasgow) said he would see what could be done regarding Mr. M'Nicol's suggestion as to a library. As one who had taken a good deal of interest in the classes in the Technical College, he knew that Dr. Grey was most anxious to adapt his classes to the needs of those of them who wished to qualify for the gas profession. At one time Dr. Grey was of the opinion that the College ought to give a certificate to those who had passed the examinations in the classes there. But he (Mr. Wilson) pointed out that this would only carry a certain weight. As they knew, the Institution of Gas Engineers were working in harmony with the City and Guilds—in this way, that it was actually their recommendation that placed the gentlemen who set the papers and who examined them. In this way the examiners were not exactly under the City and Guilds, who carried out the details. When a man obtained a certificate, he was really getting the certificate of the Institution of Gas Engineers. The Institution saw that proper men were named as examiners. This put a hall mark, and an equal hall mark, for students all over the country in a way that could not be done if every college gave its own certificate. For instance, it would be difficult to say if the man who passed in Glasgow was equal to the one who passed in Manchester. By the present process, a man knew he was up to the general standard for the whole country. He thought the foundation of the gas engineer was the mechanical engineer. Gas-works were just a big machine shop nowadays. A man wanted to get a practical training in engineering, but also a theoretical training in engineering. He wanted a practical training in chemistry, but also a theoretical training in chemistry. These sciences were the foundation of a thoroughly educated gas engineer. Added to this, he wanted a commercial training. Talking of the course laid down, he took it that Mr. Fulton almost hinted at a college course of gas engineer training. Not many of them could afford this. Regarding gas-fires, they took up the position in Glasgow that people must pay for them. They were quite different from stoves. Stoves in the summer time gave such a profit that they paid their way. They were standardized because they came to such perfection that it was not likely they would be altered. Fires were quite different. They were improving, and had, he thought, not got to the pitch of perfection yet. They should allow the makers to go ahead until they obtained a perfect gas-fire.

Mr. John Wilson (Falkirk), in concluding the discussion, said it was all very well for a man to say he wanted to be a gas engineer; but he needed a little assistance from his seniors in placing him on the right road. It was wonderful how far one could go off the road even when one was well meaning. He did not see why the Institution of Gas Engineers should not be able to set out in the form of a syllabus the classes best adapted for the student going in for gas engineering. If they appointed the examiners for the City and Guilds, why not call it the Gas Engineers' certificate?

Mr. Fulton, who was highly praised for his address by all the speakers, suitably replied.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Dublin Gas Company and its Affairs.

SIR,—I have to-day received the enclosed from one of the Directors of the Alliance and Dublin Gas Company.

Read in conjuction with my last letter to the "JOURNAL," criticizing the affairs of the Dublin undertaking, it speaks for itself.

R. W. EDWARDS ["NONULUS"].

Aldershot, Oct. 23, 1915.

[ENCLOSURE.]

Blackburn, Oct. 22, 1915.

Dear Mr. Edwards,—Would you kindly oblige me with a copy of the Aldershot Gas Company's balance-sheets for the half years ending June, 1912, and June, 1915. Best regards.—Yours faithfully,

W. H. DAVIES (of the Dublin Gas Company).

Sulphate and Potato Crops.

SIR,—I notice in your report of the discussion on Mr. Leighton's paper, on Sulphate of Ammonia, at the meeting of the Midland Association, that I am made to say that a farmer in this district ob'ained a crop of potatoes three times the quantity where sulphate of ammonia was applied over farmyard manure. I said one third more, and am pleased to say now the crop is finished that it turns out 40 per cent., and a better quality, where the sulphate of ammonia was applied.

ALFRED BIRD.

Bromsgrove, Oct. 21, 1915.

The Wandsworth Gas Company and its Coal Supply.

SIR,—I find that some observations I made to the meeting of the Wandsworth Gas Company, as to the general difficulties which had arisen in the transport of coal, have been misunderstood as applying to the loading by those collieries specially supplying the Company.

Addressing shareholders who knew that the Company possessed its own ships, and therefore controlled the bulk of its transport, I perhaps did not make it clear that I was explaining the Company's action in supporting the general movement of gas companies and others for getting Government assistance as to shipping and as to the restriction of exports.

I am glad to say that the collieries specially contracting with the Company loaded its vessels satisfactorily; indeed, one colliery which undertook a portion of the shipping—viz., the Pelton—fully discharged their obligations in that difficult respect also.

HY. E JONES.

Palace Chambers, Westminster, Oct. 20, 1915.

Lincoln Gas Undertaking.

Accounts which have just been completed relative to the principal trading concerns of the Lincoln Corporation, embody some fairly substantial figures. In the annual period dealt with up to March 31 last, 259,950,375 cubic feet of gas were supplied to private consumers, yielding £25,995, while £961 was received from private consumers, who used 10,986,523 cubic feet. The total quantity of gas sold within the city and to the Bracebridge Urban District Council and the Parish Councils of Bracebridge and Boultham was 336,467,036 cubic feet; and the balance of gross profit carried to the net revenue account, £12,603. Mr. W. H. Mainwaring (the Gas Manager), in his report accompanying the Committee's statement, pointed out that, in common with similar undertakings throughout the country, Lincoln has suffered through increased prices of raw material and dislocation caused by the war. During the autumn of 1914, there was a reduction in the ordinary gas consumption of approximately 7,000,000 cubic feet, as compared with the corresponding period of the previous year. The order restricting lighting also affected the output to the extent of upwards of a further 6,000,000 feet. Allowing for increased consumption earlier in the year, there was a decreased make of 10,000,000 cubic feet on the year. The outlook for the twelve months commencing April was most unpromising, as the cost of coal would evidently be increased to an unprecedented extent. There are about 1600 incandescent gas-lamps in the streets of Lincoln; and for these 66 gross of mantles were used during the past year. This gives an average of six mantles per lamp, which is the same as the requirements of the preceding twelve months.

Price of Gas at Saffron Walden.—Reporting at last week's meeting of the Saffron Walden Town Council, the Gas Committee notified that they had resolved to accept the instructions of the Council and reduce the price of gas from 3s. 2d. to 2s. 11d. per 1000 cubic feet, and for slot-meters to 1d. for 23 cubic feet, as from the 1st inst.

Industries of Leeds.—In various ways, the "Yorkshire Observer" says, Leeds industries are preparing for the industrial war which will certainly rage in full fury when arms have been laid down. Engineers who have many valuable ideas simmering for exploitation later on are meantime too busy on war work to devote attention to future progress; but here and there in other branches of industry a steady advance is being made in capturing markets hitherto practically monopolized by the enemy. The manufacture of gas-mantles, for example, has reached a high-water mark which would have seemed unattainable eighteen months ago. At that time the struggle was to "get in" in the face of an almost overwhelming competition; now it requires equally strenuous work to cope with the huge influx of orders caused by the withdrawal of the competition. That the German rivals have not been disposed of for good is quite well understood. But painstaking researches into the chemistry of ramie grass have enabled more skilful processes of manufacture to be adopted; and the future is looked forward to, if not with equanimity, at any rate with calm confidence.

REGISTER OF PATENTS.

Separating Volatile Products from Solid Carbonaceous Material.

OIL AND CARBON PRODUCTS, LIMITED, of Adelphi, W.C.

No. 13,868; June 26, 1914. Convention date, Jan. 7, 1914.

This invention relates to apparatus for the separation of volatile products from solid carbonaceous material—coal, shale, peat, &c.—by heating in a retort and conveying the evolved vapours to a cooler region. In prior systems of separation, the patentees remark, this cooler region has usually been constituted by separate condensing apparatus.

The present process of separation consists in maintaining a number of regions occupied by the material within the retort at temperatures increasing from the inlet end by the indirect application of heat, moving the material through the retort under non-oxidizing conditions, and so regulating the temperatures and directing and controlling the withdrawal of the condensable volatile products that their different grades are evolved from all portions of the material at their respective vaporizing temperatures, and thereupon conveyed into contact with relatively cooler portions of the material in its solid or partly vaporized state, whereby condensed volatile matter is obtained which can be removed from the retort in liquid form.

The conveying of the material through the retort—which is preferably cylindrical and slightly inclined upwards towards the hot end—may be most conveniently effected by means of a helical blade working on a rotary shaft; and the uniformly graduated temperature of the material is maintained externally by providing an annular space around the retort and arranging in the space one or more axial rows of gas and air jets of graduated size. A graduated heating may also be applied to the material from inside the retort in such a way as to heat the core of the material as well as its outer part. For this purpose the conveyor may be adapted to act also as a conductor and radiator of heat, as described in patent No. 15,381 of 1914. Consequently the material under treatment at any cross-section of the retort is heated uniformly owing to the application of heat not only from the cylindrical wall but also from the conveyor.

The gaseous medium, which may be the washed and purified uncondensable gaseous product from the retort, is introduced in a cold condition, and so serves to cool the coke as it passes out of the retort. It is made to travel through the retort at a comparatively slow speed, and therefore assumes the successively decreasing temperatures of the successive regions through which it passes. It may also be pointed out, the inventors remark, that since the material under treatment travels into regions of progressively increasing temperature, instead of entering immediately into a region of maximum temperature, the volatile constituents of the material are gradually "sweated out" and cannot be overheated or "cracked," because as soon as they arrive at the region corresponding to their vaporizing temperature they are immediately taken up by the gaseous medium and conveyed to a cooler region into contact with relatively cool material, whereby their condensation is for the most part effected. Moreover, even if the hot end of the retort is raised to a temperature considerably exceeding the vaporizing temperature of the least easily volatilized constituent, no overheating of the vapour takes place, because all the grades of vapour are carried off by the gaseous medium at the regions corresponding to their respective vaporizing temperatures. In the hotter regions beyond the region at which the least easily volatilized constituent is carried off, the coke or other vapour-freed material is merely heated further, but yields no more volatile constituents condensable at approximately atmospheric temperatures, since all the latter have already been removed at their respective vaporizing temperatures in cooler regions within the retort, as already stated.

Fig. 1 (p. 207) is a side elevation of a set of five retorts and accessories—the lowermost retort being shown in section. Fig. 2 is an end elevation, and fig. 3 a plan. Fig. 4 is an enlarged cross section of the retort.

The cylindrical retorts A, arranged one above the other, are each enclosed in fire-clay slabs B shaped to provide an annular space C, which may be filled with loose broken brick or fire-clay. Through each retort extends a shaft D, to which is secured a sleeve, formed with a helical blade—both removably secured to the shaft so as to rotate with it. The retorts are slightly inclined, and their lower ends are secured to inlet boxes into which the material to be treated falls from a hopper E by way of a rotary valve F. The helical blades extend into the inlet boxes, and their shafts project through the boxes and are provided with ratchet wheels for engaging with pawls mounted on rocking arms G, operated in one direction by a hydraulic ram and in the other direction by the unbalanced portion of the combined weights of the arms, which are partially balanced by a weight. Each of the boxes contain a part-cylindrical scoop situated beneath the adjacent part of the corresponding helical blade without, however, entirely obstructing the vertical passage through the box; so that the material escaping over and around the blade and scoop in one box descends into the box below it.

The upper end of each retort is secured to an outlet box, into which the spent or vapour-freed material is thrust by the blades, whereupon it falls down, and is delivered through a rotary valve H to a truck in a sunk track or passage-way.

In the lowermost part of the space around each retort extend longitudinally two pipes J, one for air, the other for gas. The pipes are radially perforated at intervals in their length, and are angularly adjustable to enable the gas and air jets to be directed at any desired angle against one another. The holes are graduated in size—the largest being at the gas inlet end. The gaseous medium is introduced in a cold condition and at a pressure of about 4 lbs. to the square inch into the top of the exit valve H.

In operation, the material to be treated enters the retorts at atmospheric temperature through the inlet boxes, and is slowly conveyed by the blades through the retorts from left to right; while the cold

gaseous medium enters the retorts through the outlet boxes and travels from right to left. The material under treatment encounters regions of progressively increasing temperature, and the gaseous medium conveys the vapours evolved at any region into regions of lower temperature, as already described—the result being that the spent or vapour-freed material passes out of the retorts on the right hand through the valve H comparatively cold, while the condensation of the evolved vapours occurs near the left-hand end of the retorts by contact with the cold incoming material. The condensed vapours flow down the retorts and through the inlet boxes, and are withdrawn below the lowermost box by way of the receptacle K. The liquid may then be subjected to fractional distillation in the ordinary way. The gaseous medium and the uncondensable vapours pass out of the retorts through exits, and are afterwards washed and purified in a similar manner to that adopted with the retort gases of ordinary coal-gas manufacture. The quantity and character of the uncondensed vapours passing through these exits are dependent in part upon the temperature at which the lower end of the retort is maintained. Some of the resultant gas is used again as the gaseous medium of the process, and the remainder stored.

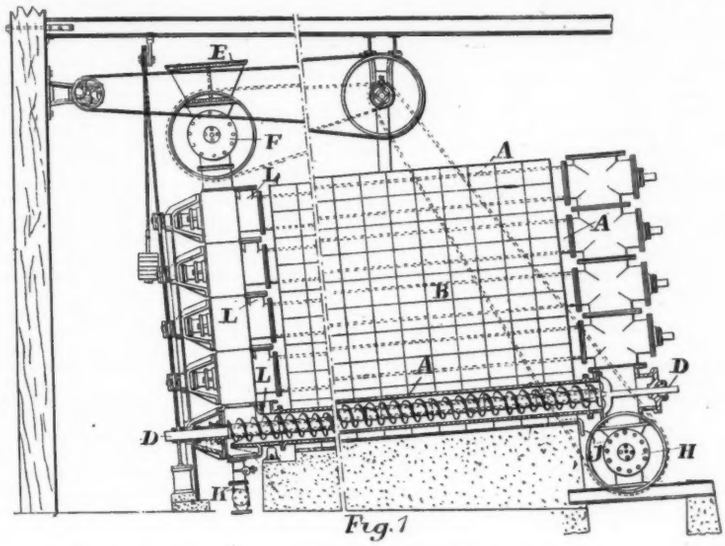


Fig. 1

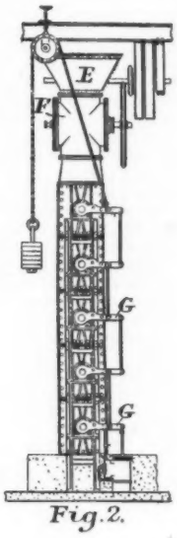


Fig. 2.

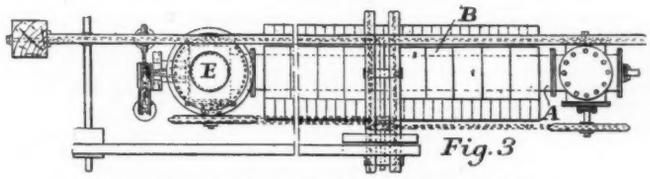


Fig. 3

The "Oil and Carbon Products" Company's Plant.

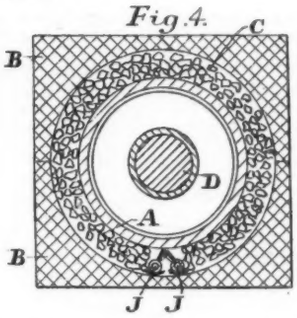


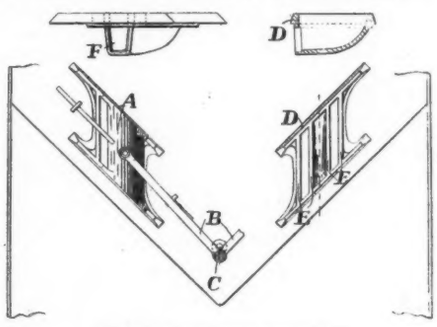
Fig. 4.

Gas-Meters.

HIBBERD, C. E., and GOAD, F. L., of Edinburgh.

No. 20,922; Oct. 13, 1914.

This invention relates to meters having reciprocating valves for distributing the gas in the sheet-metal casing divided into two compartments by a horizontal partition—the lower compartment being further divided into two measuring chambers by a vertical partition.



Hibberd and Goad's Gas-Meter.

The illustration shows a plan and a cross-section of the valve grating employed, and a plan of the valve plate.

The meter to which the patentees prefer to apply their invention is of the type in which a pair of measuring chambers of the double pie-dish form are arranged back to back—one on each side of the longitudinal centre plane of the meter—so that the flanged joints of the measuring chambers, their back and front walls, and the general planes of the diaphragm clamping plates are all parallel to the centre plane. The valves A thus receive their motion, by connecting rods B, from a common crank C forming part of a vertical shaft or spindle, which is rotated in the usual manner by flag and flag-rod mechanism; while the lines of motion of the valve are symmetrically arranged in respect to the centre plane of the meter and are inclined about 45° to it.

According to one form of the invention, each valve grating consists, as before, of two lateral bars D (parallel to the lines of travel of the valve), connected by four cross-bars or bridges E, so as to leave three intermediate ports. But, instead of the cross-bars being at right angles to the lateral bars, they are arranged at an angle and parallel to the centre plane of the meter. The ports are of the usual elongated form—their shape being that of a rhomboid, instead of a rectangular parallelogram, while the general shape of the grating conforms more or less to that of the ports.

Each valve, which is preferably of D type, is modified in a similar manner as regards its general shape and the obliquity of its ports, so as to co-operate with the grating described—the one valve being right-handed and the other valve left-handed. The exhaust duct F is formed integral with the valve grating, instead of being built-up in the usual manner.

By arranging the valve grating as described, the connection between the exhaust port and the outlet tube of the meter is simplified, while the length of the solder joints is reduced, and the soldering operation facilitated.

Regulating the Supply of Gas to Burners.

PICKARD, W., of Rochdale, and BENTLEY, J. E., of Blackpool.

No. 22,847; Nov. 21, 1914.

This invention relates to regulating means of the kind in which is a floating needle valve, arranged within a chamber, controlling the gas by closing or opening the passage through which the gas flows to the burner; the movement being adjusted to suit either high or low pressure gas.

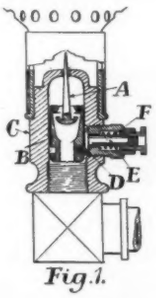


Fig. 1.

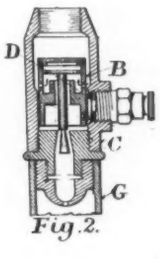


Fig. 2.

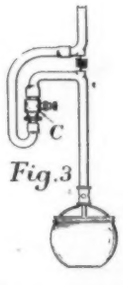


Fig. 3

Pickard and Bentley's Gas-Burner Regulator.

Fig. 1 is a vertical sectional elevation of the device as applied to an upright burner. Fig. 2 is a like view as applied to an inverted burner.

Fig. 3 shows the application of the regulator in the length of the supply pipe of a pendant gas-fitting.

The regulating appliances comprise the valve A within a tubular casing B slidably fitting the outer fixed body C of the burner fitting. The valve is of the needle type, with a mushroom shaped head; the needle part being designed to extend upwards and through an opening in the top of the casing B, and also through an opening in the upper end of the casing C. The interior of the casing B is formed as an inverted cone, instead of being narrow at the top and wide at the bottom—the advantage of thus forming the chamber being, it is said, that the gas, after first lifting the valve, tends to act upon the top side of the head part of the valve and thus prevent any sudden closing of the upper opening under any slight increase in pressure.

To regulate the position of the valve in relation to this opening, and according to the pressure of the gas, the casing B at its lower end is formed with an annular groove into which projects the pin of a disc D, eccentric to the centre of the disc. The disc is carried by a spindle E rotatably and slidably mounted in a lateral boss screwed on to the casing C. By means of a spring F, the disc is frictionally held against the end of the boss, and thus remains in any position to which it is rotated. By rotating the disc D, the pin raises or lowers the casing B, and thus varies the position of the valve seating in the casing relatively to the opening in the casing C.

In fig. 2, a space is left between the exterior of the casing B and the interior of the casing C, while the top of the casing is entirely enclosed by a cap. In the wall of the casing B, and below the level of the valve head (which latter is preferably of disc formation), are holes. The stem of the valve passes down and through a tubular part of the casing B, and also through the opening of the outer casing C—this latter, for the purpose of admitting the casing B, being in two parts. The lower part of the valve stem is formed conical and with the narrower part uppermost, so that, with the raising of the valve head off its seating under the pressure of the gas—the latter entering via the holes and passing down and through the opening—the conical part of the stem operates to regulate the supply of gas to the burner.

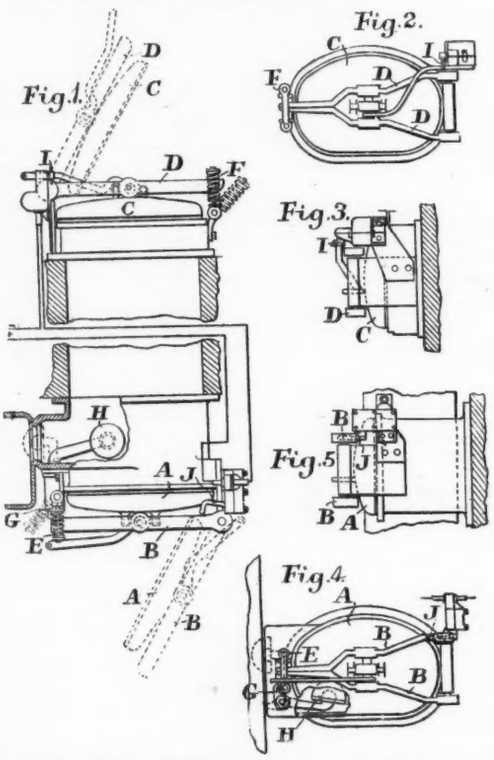
As shown in fig. 3, the fitting (fig. 1) may be used as a union in the length of a flexible pendant fitting.

Closure Locking Means for Gas-Retorts.

CARPENTER, H. A., and WARNER, A. W., of Sewickley, Penn., U.S.A., and the RITER-CONLEY MANUFACTURING COMPANY, of Pittsburgh.

No. 20,199; Sept. 25, 1914.

This invention relates to the provision of gas-retorts at each end with doors which are normally closed, but which are opened during the charging, discharging, or other operation of the retort; and the object aimed at is to provide for the control of the doors "in such a manner as to prevent premature opening of a closure, whereby accidents or delays in the operation of the apparatus, such as sometimes happen, due to premature opening of a closure, are avoided."



Carpenter and Warner's (Riter-Conley Company) Retort-Closing Mechanism.

Fig. 1 is a sectional plan of the charging and discharging ends of a gas-retort and the closures therefor—the latter being shown closed in full lines and open in dotted lines. Fig. 2 is a front elevation of the closure at the discharge end. Fig. 3 is a side view of it. Fig. 4 is a front elevation of the closure at the charging end. Fig. 5 is a side or edge view thereof.

As illustrating an embodiment of the invention, A is the closure for the charging end of the retort, and B its hinged bar-like support; while at the discharge end C is the closure, which is carried by the hinged bar D. The free end of the bar B is confined by a laterally swinging latch mechanism E, and similar mechanism F performs the same function for the bar of the discharge closure. Horizontally swinging arms control the manipulation of the bars necessary for releasing the latch mechanism.

For so connecting the charging and discharging closures that the latter cannot be opened in advance of the former, mechanism is interposed which at the charging end is operated by the movement of the hinged closure support B, and at the discharge end co-operates with the swinging arm, which is held locked (as indicated in full lines) until the front closure has been opened. While there is no impediment to the movement of the arm of the charging closure from the position shown in fig. 4 and in full lines in fig. 1 to the open dotted position of fig. 1, the support B cannot be released from its latch E until the index arm G is moved out of the way of the latter, which can only be accomplished by closing the valve H so that it is mechanically impossible to swing the support to the open position before closing the off-take valve.

The mechanism for connecting the front and rear closures for ensuring their opening in proper sequence may be variously arranged. As embodied, the mechanism includes an electric motor device for actuating the discharge closure lock, together with a switch for the circuit of the device, which is opened by the closing movement of the inlet or charging closure, and closed by the opening movement of it.

The lock device for the arm of the discharge closure consists of an arm which is forked at I to embrace the arm when it is in closed position, as shown in full lines in fig. 1; the arm being secured to a rock-shaft journaled in a casing secured to the mouthpiece, and secured to the shaft within the casing is an arm which, when raised, keeps the lid from swinging outward into the releasing position.

When the support B and closure A are in their position shown in fig. 1, an arm J is pressed inward, and the circuit breaker employed is held in the open position notwithstanding the pressure of a spring. But as soon as the support swings into the open position, the spring moves the arm into engagement with the necessary contact and closes the circuit. This results in energizing a solenoid, and the upward movement of its core tilts a bell-crank latch and releases the lock for the arm of the discharge end closure, whereupon the latter may freely open. But prior thereto the closure C is held securely locked, and it is quite impossible to open it in advance of opening the front end or charging closure A. And as the latter cannot be opened until communication is closed between the retort and off-take, "the sequence of operations is relieved of the uncertainties of human control—the several elements being so connected as to insure their operation in proper sequence."

APPLICATIONS FOR LETTERS PATENT.

14,339.—LAW, J. R. K., "Extinguishing gas-lamps." Oct. 11.
14,390.—ROLLASON, F. A., "Carbonization of coal in vertical or inclined retorts." Oct. 12.
14,391.—TWYNAM, T., "Utilization of Mond gas, and recovery of bye-products." Oct. 12.
14,481.—GRAHAM, J. T., "Air-gas plant." Oct. 13.
14,565.—DRAKES LIMITED, and DRAKE, J. W., "Removing coke." Oct. 15.
14,624.—HALL, I., "Burners for producer gas." Oct. 16.
14,635-6.—LAW, J. R. K., "Automatically controlling the supply of gas to lamps." Oct. 16.

Grays and Tilbury Gas Shares.—Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., are, on behalf of the Grays and Tilbury Gas Company, issuing by tender 600 £10 "B" shares. These will rank for a standard dividend of 7 per cent., equally with the Company's existing similar shares, now receiving £5 19s. per cent. The minimum price is £10 per share.

Brigg Gas Charges.—At a meeting of the Brigg Urban District Council on Friday, a statement was presented showing a small estimated deficiency at the end of the year upon the gas receipts. It was decided to make no alteration in the charge to slot-meter customers, but that if any change-over was made by ordinary consumers they should be required to pay 7s. 6d., and keep to the slot-meter for three years. For gas used otherwise, it was agreed to increase the price by 7½ per cent.

United Tube Corporation.—The United Tube Corporation, Limited, has been registered at Somerset House, with a nominal capital of £150,000 in £100 shares. The Board of Trade authorize the acquisition of a part of the undertaking of the British Mannesmann Tube Company, Limited, the books and documents of which are liable to inspection under the Trading with the Enemy Act, 1914. The Company is a private one, and the first Directors are Colonel J. R. Wright, Mr. S. Baldwin, M.P., Mr. J. C. Davies, Mr. G. Hethey, Mr. H. W. Dunn, and Mr. A. Hethey, with a qualification of £1000.

Need for Gas Incinerators.—In a paragraph on the displacement by gas of the kitchen coal-range, the "Sanitary Record" says: The ordinary coal-fire is disappearing from our homes; and in course of time, owing in great measure to the remarkable improvements which are being effected in the manufacture of gas-fires, the latter will be found to be so much cheaper in maintenance than coal-fires that the latter will be deemed to be extravagant and—as they undoubtedly often are—wasteful. We are met, however, by those who use gas-fires with the contention that the disposal of garbage and household refuse constitutes a serious difficulty. This can only be overcome by the invention of a gas incinerator or garbage destructor. Probably the most acceptable solution would be found in a gas-fired garbage destructor so constructed that the heat would be utilized for providing hot water for the household and for baths. The enterprise and inventive capacity of gas engineers are so conspicuous that we venture to believe they will succeed in meeting what is really a necessity.

LEGAL INTELLIGENCE.

CLAIM FOR GOODS SOLD AND DELIVERED.

Yesterday (Monday) the action of Firth Blakeley, Sons, and Co., Limited, *v.* the United Gas-Works Development Company, Limited, came before Mr. Justice Avory and a Common Jury.

Plaintiffs, who carry on business at Thornhill Lees, Dewsbury, sought to recover £305 17s. 11d., being the balance of account in respect of goods sold and delivered and for work and labour done in connection with the erection of new arches of retorts, annular condensers, single-lift gasholder, pipes and specials and straight lengths, in coupling mains and overhauling and repairing gas-exhausters, and other work.

Defendants, who carry on business at No. 14, Victoria Street, Westminster, pleaded that it was a term of the contract that plaintiffs should guarantee that the whole of the work would be executed in the best manner, so as to give the most complete satisfaction to defendants; that all iron and steel work should be executed in the best manner, and that the work had not been done in a satisfactory or workmanlike manner, with the result that the gas did not pass from the retorts to the gasholder, causing a back-pressure, which back-pressure might cause an explosion and prevent a supply of gas to the town. They also said that the new gasholder would not work in a satisfactory manner, and by way of counterclaim sought to recover the price of certain materials alleged to have been improperly employed by the plaintiffs.

In reply, plaintiffs denied that the work was not done in a workmanlike and proper manner, or that they had improperly removed any materials.

Mr. Frank Phillips appeared for the plaintiffs; the defendants were not represented.

Mr. Phillips said the defendants had been very vigorous up to this moment in the way of defence, but they were not present to defend the action. Defendants had promoted several small companies in various parts of England, and had work done for them; and the present action was brought to recover the balance of account for work done by plaintiffs in erecting a gasholder and retorts in order to enlarge some gas-works in which defendants were interested in South Wales.

Formal evidence having been given that the work had been done, and that the money was due, the Jury found for the plaintiffs; and his Lordship entered judgment for them, with costs, both on the claim and counterclaim.

Reservoir Embankment and a Right-of-Way.

In the Lancashire Chancery Court, before Vice-Chancellor Stewart-Smith, K.C., last week, an action was part heard in which the Bolton Corporation sought to obtain an injunction against Mr. Edward Deakin, the owner of extensive works at Belmont, a village about 6 miles to the north of Bolton, to restrain him from committing a trespass upon, and claiming a public right-of-way over, an embankment at the Belmont reservoir of the Bolton Corporation. It was also sought to restrain deliberate and premeditated incitement on the part of Mr. Deakin to the general public to follow his example in trespassing on the road. Counsel said the case was one of the greatest possible interest to the Corporation, because Mr. Deakin claimed that this embankment road was a highway for all manner of traffic. The road ran along the top of the embankment, which in some places was 86 feet high. It held up an enormous quantity of water; and there was not the least doubt that if it were decided that the road was a public highway for all manner of traffic, the safety of the embankment would be seriously jeopardized, and it would be necessary to strengthen it at an immediate cost of something like £30,000, with considerable expenditure on maintenance. In 1890, the Corporation found people were using the embankment road who were not entitled to do so, and that the embankment was showing signs of becoming insecure. They took steps to prevent the road being used by unauthorized persons, and spent money in strengthening the embankment. The defendant thereupon asserted that a public right-of-way existed; and he organized processions which he headed, on horseback, accompanied by bands of music, in assertion of this right. From that time to the present there had been recurring disputes between Mr. Deakin and the Corporation of Bolton with respect to the user of the road. No complaint was made of the defendant's use under the rights conferred upon him by his lease, but to his claim to the use of the road as a public thoroughfare. For the defendant, it was urged that the road in dispute was a public highway, having been dedicated to the use of the public in 1847, at which time the reservoir was the property of the old Bolton Water Company. The Corporation came into possession in 1854, under their Act, and, in fact, stepped into the shoes of the Water Company. There was evidence that traffic of all kinds passed over the embankment road, and that no attempt was made by the Corporation or the landowners—the Corporation not then being owners of the land—to interfere with such user. No action was taken to dispute the right of the public to use the road until 1890. Gates were put up; but they were only for the purpose of preventing cattle from straying upon the embankment. They were not locked till 1910. This came to Mr. Deakin's knowledge; and he took steps to assert the right of the public to use the road—several times removing locks and driving through. No action was taken by the Bolton Corporation in regard to these acts. Evidence was given by defendant (who declared that all his actions had been based upon the footing of his being a member of the general public) and other witnesses; but at the end of this, Mr. Deakin's Counsel announced that his client was prepared to assent to the view that the defence that this was a public highway was one which could not be sustained. This, however, would in no way interfere with the private rights of Mr. Deakin as a tenant, which were not affected. The injunction claimed by the Corporation was granted, with agreed damages of 20s., and the costs of the action.

MISCELLANEOUS NEWS.

EVIDENCE ON FACTORY LIGHTING.

Resuming, with the fifth day's sitting, the evidence given before the Home Office Departmental Committee on Lighting in Factories and Workshops [*ante*, pp. 98, 149], main consideration must be given to the statements made by Messrs. Franklin Thorp and Harvey T. Thorp, who appeared on the nomination of the Institution of Gas Engineers.

Mr. *T. E. Ritchie*, head of the Test-Room Department of the Union Electric Company, Limited, who was the first witness examined, and pointed out that he appeared before the Committee in his individual capacity, said he thought that the degree of inequality of illumination was of the very greatest importance, because this was the factor which was mainly responsible for accidents. It was the thing which created the contrast—the black spot and the bright light. He meant the bright light on the work in a lathe, and the black spots on the gear, at the back, where a man got his hand trapped, and that kind of things This consideration of the degree of inequality which could be permitted was so important that his Company's whole method was based in the first place upon the fundamental use of it. In a large new Birmingham works, the suggested limits for engineering and allied work had been fixed. The maximum allowable degree of inequality in the illumination decided upon was: Forging and smiths' work and casting and founding large work, 100 to 20, which gave a diversity co-efficient of 5. Machine shops and fitting shops, 100 to 40, which gave a diversity co-efficient of 2·5. Pattern-making shops, 100 to 50. There were, of course, many conditions under different circumstances which would necessitate the inequality being reduced—*i.e.*, the lighting made more uniform in intensity—though there was nothing, he thought, which would warrant it being increased. The figures he had been giving referred to large light units. The great difficulty all through this illumination question was that those who had perforce to acquire knowledge of it wished to retain the advantage to themselves. It had a very great bearing upon the dividend-earning capacity; and they would not divulge this sort of thing. The minimum illumination in the different shops of the works he had referred to ranged from 1·25 to 2·5 foot-candles, within the four walls, on a horizontal plane 3 ft. 3 in. from the floor. If a reasonably good minimum illumination was fixed, with a moderate degree of inequality, the final result was bound to be satisfactory. He was afraid the Committee could not fix anything in the way of a maximum; but they could very reasonably determine upon a minimum. It was impossible to get practical lighting with 100 per cent. of equality; so that the average was bound to be reasonably in excess of the minimum, whatever it might be. Taking textile work as a whole, he did not think one could get satisfaction (unless for white work only) with less than a minimum for general illumination of from 4 to 6 foot-candles, to meet the varying conditions. For the ordinary run of work, no doubt, from 2½ to 3 foot-candles would be sufficient.

The CHAIRMAN remarked that the question of the permissible degree of inequality of illumination was one the Committee had not previously had prominently before them; and it raised some interesting points. It would therefore be an advantage to the members to study Mr. Ritchie's evidence before concluding his examination.

Mr. *Alexander Siemens*, representing the Institution of Electrical Engineers, gave particulars of the lighting of Messrs. Siemens' works. For general lighting, a figure was shown of about 0·5 foot-candle; and between 2 and 4 foot-candles for individual lights. It had been found that the lighting was really too much. With regard to determining a minimum artificial illumination for workshops, it had been found impracticable to lay down general rules, nor had any special investigations been made to define such rules, as it was so easy under modern conditions to modify artificial lighting. The trial-and-error method had been acted upon; the experience gained in practice being duly considered.

The CHAIRMAN: If there were some authority which could step in and say that the lighting is inefficient and ought to be improved, would that be desirable?

Witness: I have lived so long in England that I have taken on some of the English independence. I do not like to be bothered.

We started on the supposition that it was in your own interest, not only that of the workmen?—I say the workmen and employer know their own interests perfectly well; but whether a third party knows it, I am not certain. It is essential to have a good light for good work. My difficulty is in fixing the minimum, and seeing afterwards that it is conformed to.

Mr. *R. Trebatcoff* and Mr. *A. Hillman* appeared on behalf of the Jewish Tailors' and Tailoresses' Trade Union, to ask that a standard should be adopted both for natural and artificial lighting, and also for the doing away with lighting by open gas-jets, the heat of which (as it was necessary to have them so near) had a bad effect on the workers' eyes. They recommended the use of either high-power gas-lights, with shaded globes, or electric lamps. Where good lighting was provided, they had found satisfaction expressed by the members of the Union; but the question was one which had been very much neglected. Every tailor employed in a shop should have a light to himself.

Mr. *Franklin Thorp*, who appeared with Mr. *Harvey T. Thorp*, on the nomination of the Institution of Gas Engineers, said his firm had put in something like 25,000 lights per annum for the last three years, mainly in textile factories in Lancashire and Yorkshire. Their principal business was with the spinning and weaving mills; but they had lighted many engineering shops, warehouses, &c. After carefully reading the excellent report of Mr. Wilson in the 1911 Annual Report of the Chief Inspector of Factories,* he recognized that his observations would be principally bearing out those made in the report. The artificial illumination of factories and workshops had been carried out in a very unscientific manner as regarded the actual measurement of illumination, even by some who said that they understood the subject.

* See "JOURNAL," Vol. CXIX. p. 38, 113.

There were a great many people putting lights in factories who did not understand what foot-candles meant; but even those who thought they did, had not calculated on the foot-candle basis, except in a few instances where the gas engineer in question had particularly demanded it. Very few of the people who did the lighting had photometers which were of any use. He felt a very useful work had been commenced by the formation of this Committee; and it would be a good thing if some basis could be arrived at as soon as possible, in the interests of everybody. In addition to other points already emphasized, he would suggest as two important principles—(*a*) The system of lighting should be such that light failure should be practically impossible while the machinery was in motion; and (*b*) the light should not be subject to avoidable rapid deterioration. While agreeing with the argument that the intensity of light should vary according to the material upon which the work was being done, he was afraid it would be a difficult matter in practice to vary the candle power. It would probably be preferable to make a standard unit, and let it be sufficient for the darkest material to be worked upon, rather than have a varying one, because experience showed that manufacturers were not against giving a good light—in fact, they liked to do so. In the Nelson district of Lancashire, particularly where the turnover was the main thing, the amount of illumination given was very high. They were now putting in double the number of lights that had sufficed up to the present. They liked to arrange that there should be a minimum illumination on the work of from 3 to 4 foot-candles. This would mean a maximum of 6 foot-candles with the lights close together—one light to two looms. These figures were sufficient for either white or coloured goods.

The CHAIRMAN: Beyond the fact that the manufacturers ask for more light, have you any definite evidence that they now realize the relation between the turnover and the amount of light?

Witness: I have asked in many cases for particulars, but have been told there are so many factors that come into it that they cannot be definitely stated. We believe that they realize it; but we cannot learn definitely that it is so. The ground for this belief is that they are still increasing the amount of light.

In reply to further questions witness said he did not think there would be any real objection on the part of manufacturers if a minimum standard of illumination were specified. He had tried in some cases to put in a very large unit of light; but the loss due to reflection was such that they needed much more illumination.

The CHAIRMAN: In the case of one lamp to four looms, they are bigger lights?

Witness: Much bigger units. I believe that in the Nelson district, at one of the meetings, the weavers were insisting upon one light to two looms with the smaller unit. We found also that in the case of the smaller units, when the factories got very hot in the summer time, by using the gas-compressor, and sending air through in place of gas—it smells for a few moments, of course—it had a wonderful moral effect on the weaver. I do not think it makes very much difference in the amount of fresh air brought in; but the weaver knows something is coming in, and feels she is getting the benefit of it. With one light to four looms, there is a decreased capital expenditure—the cost being roughly, with compressor and fittings, (say) 8s. a point. If you double the number of lights, you double the capital expenditure.

Further examined, witness said he thought a test specifying a minimum horizontal illumination would not be satisfactory in all cases. Generally speaking, fixing a light 6 ft. 6 in. from the ground overcame the difficulty of glare. He showed photographs of lighting installations, and pointed out that gas-lights could be arranged so as to make it possible to raise or lower them as desired. Continuing, he said that, after careful consideration, he was of opinion that any standard of illumination which might be proposed should really be on the basis of the candle power of the light-source and the spacing. It could be safely left to the owners to arrange the best positions. Then the factory inspector might be left to decide whether the candle power of the individual units was sufficient, or whether it was equal to the minimum specified, and whether the shading of the lamp was enough to comply with the restrictions as regarded glare. In other words, his present feeling was that he would prefer to have candle power and position. The reason why this would be more advantageous than illumination (say) on the vertical and horizontal plane, was the difficulty of testing. If one could specify that the light must not be less than a 50-candle power lamp, efficiently shaded, and spaced not more than a certain distance apart, it would in many cases be possible to secure good lighting where the illumination was required. It could be specified that the curve of the lamp should be of a certain shape; and from this one should take three tests—the vertical test, and (say) 30° and 60°. Any light above 60° was of very little use when one was only allowing 12 feet apart; and anything beyond this distance could be left out of consideration. Asked what he allowed in cases where light came from the walls, witness said he was afraid they did not take this into consideration, because in some instances they were kept well whitewashed and in others not.

Mr. PATERSON: Supposing a man instals in his factory a number of high lights, and then for localized general illumination a number of small ones, you could not apply a specification which only comprised cases of single lamps of that kind, because you would have to take into consideration the illumination from the high lamps, and you would have a complicated calculation before you got at what the candle power was?

Witness: That is quite true; but we meet so very few cases where it is actually done, except in engineering works.

Continuing, witness said his evidence was chiefly with regard to cotton factories and gas lighting. The advantages of candle power rather than the foot-candle were not peculiar to gas. If anyone could devise a photometer which would take a fair test, he agreed the illumination test would be the proper standard. Any regulation that was made ought to have some distinct reference to the trade to which it was applied. If it was agreed, for example, in the cotton weaving trade that there should be a minimum illumination of 4 or 5 foot-candles, he thought the specification that could be substituted for this would be so many lamps of a certain candle power, at a certain height, for so many looms. It would not be difficult to specify the particular direction in which the photometer measurement should be taken. It would be necessary to stipulate that it must be taken at right angles to the loom. The question of shading and character of fittings was very important; but unfortunately the ideal condition could only be realized at great cost. For many purposes adjustable lights with parabolic shades were very valuable, as they enabled the light to be directed as required, and effectively shaded the light-source; but except for special purposes, they were not adopted in textile factories. The question of sufficient illumination was one which fortunately appealed to worker and employer alike. There had been a tendency in the past to cut down capital cost by using one 150 candle power light for four looms; but experience had shown that two lights of 80-candle power for four looms possessed many advantages. In many cases, one light to two looms was being asked for. The question of adequate lighting must vary very much; but he should say that in cotton weaving one light of 50 candles for each two looms should be the minimum, and where horizontal illumination was permissible a minimum of 3 foot-candles. In the case of a well-illuminated yarn-winding shed, he found the lighting bill worked out at only 0·18 per cent. of the turnover. It was becoming an important matter to the manufacturer to give a good light, as, owing to the scarcity of weavers, the workers naturally chose situations which were most favourable; and he had known one or two cases where weavers in sheds lighted by flat-flame burners and carbon filament lamps had given up the work, when there were better incandescent gas-lights in a shed near by. It was interesting to note that there were still a large number of flat-flame burners and carbon filament lamps in use. Mr. Arthur Andrew, the General Manager of the Oldham Corporation Gas Department, had recently [June, 1913] taken a census of the lights in mills and workshops in Oldham, and found that there were 65,596 incandescent burners and 44,946 flat flames in use. This was a very much larger number than they expected would be still there. There must also be a large number of carbon filament lamps; and he thought both these and flat flames ought to be condemned at once, because of the small illumination they gave. The minimum candle power of the high-pressure burners he ordinarily put in was 50 candles. He had known many instances, where flat flames and carbon filaments had been in use, where the wrong colours had been put in the shuttles, and cloth spoilt. The light should be of such a quality that it would not allow of these mistakes; and they knew that the incandescent mantle was much better than either the flat flame or the carbon filament. Then, again, failure was a point of the greatest importance. Electricity, whether produced by the works itself or taken from the town supply, should work through an accumulator, or there should be a number of gas-jets burning for safety. Failure of a gas supply was almost unheard of, and need not be considered; but where high-pressure gas systems of 50 inches and upwards were used, a strap breaking or an accident to the compressor might cause light failure. In these cases, a few lights in the roof on town pressure should always be kept going. The same thing applied to systems using a mixture of gas and air or high-pressure air. Methods of gas lighting using the gas compressed to (say) four or six times the normal main pressure did not require any auxiliary light, as the volume of gas used varying with the square root of the pressure there was one-half the volume of gas passing even when the compressor was stopped; and this was sufficient to illuminate the mantle to a considerable extent. As to the deterioration of lighting by reason of dirty glassware, in his opinion, should be eliminated wherever possible. With the glow lamp, this was quite impossible; but with incandescent gas-lights he never employed glass, except for very draughty positions. A simple form of wire guard was all that was necessary to protect the mantle from danger. The dirt and dust met with in foundries, weaving sheds where the cloth was heavily sized, card-rooms, &c., was frequently the cause of rapid deterioration of illumination owing to its choking the orifices of the burner, and preventing sufficient air getting to the burner to fully consume the gas. Gauze filters had been introduced in some cases, but with little success, as the gauze was quickly choked. A correctly designed burner, however, could be, and was, used without difficulty in all but the very worst cases. He suggested that the burner specified should be such that it did not deteriorate in candle power beyond a certain amount within 300 or 400 hours. In some cases the addition of filtered air at the compressor decreased the difficulty, as only some three parts in place of five were taken from the room. This was not a cure; and they had been compelled in several instances to add all the primary air necessary for combustion at the compressor, so that no air was taken in at the burner in the room. This method of mixing the full amount of air and gas together might be thought dangerous; but they had not found any trouble, and the insurance companies had passed the system. They advised, and they always installed themselves, a safety-plug at the end of the pipe, to prevent any possibility of the light striking-back into the pipes. The nipple itself was made long, so that the heat was extracted from the explosion coming back; and then they put in a safety-plug as an extra safeguard. Another thing was that the taps which controlled the lights, in the case of suspended lights with metallic tubes, should always be placed above the metallic tube. He had known cases where they were below; and in turning them one was pulling the tube and causing it to leak. There were also no means of control; whereas if the tap was at top, one could cut off the gas supply if necessary.

Professor SHERRINGTON: I would like to ask whether, both in the case of gas and electric light, if you double the lights would not this create difficulty in regard to ventilation?

Witness: No, because in the old flat-flame burners we were consuming about 6 cubic feet of gas for each light, where now we are only burning 2 feet. So in all cases, even where we double the lights, we have almost half the consumption of gas. On the question of heat in gas lighting, this helps to some extent, because in the cold weather you have your lights on very often, and it assists in the heating of the room to a certain extent, and also in the ventilation, by causing currents of air to move.

Mr. PARSONS: Is it common to have these incandescent lamps unprotected by glass globes?

Witness: Yes. We have put in at least 100,000.

Do you get any bad effect from the rays from the lights?—I do not think so.

There is a good amount of ultra-violet rays from incandescent gas?—Yes, there is; but not so much as from a metallic filament.

You have known it in use for a long time without any bad effect?—

I have not noticed any bad effect at all for the last six or eight years. And no complaints from any source. We have had no cases where we have had any real glare.

There is a very considerable absorption of ultra-violet rays by clear glass, and this prevents a good deal of the trouble from electric light. I was wondering whether it was sufficient protection from incandescent gas under pressure?—At very high pressures you may get more ultra-violet rays; but with the usual 6-inch pressure I think the amount of ultra-violet is not sufficient to do any harm, even without shading. I should say that we find the flickering of the arc—that is to say, the unsteadiness of the light—has more effect on the eye than any ultra-violet rays. There is a mill in Bolton where they have both indirect arc lighting and inverted incandescent gas lighting under one roof. There is just a division wall between. That is, the two systems are working side by side in the same mill, and under the same management. We have an installation in there which is working satisfactorily; and the workers much prefer the incandescent gas-lights.

Mr. *John Taylor*, Secretary of the Cotton Spinners' and Manufacturers' Association, spoke of the advantages of high-pressure gas. He did not think there was much trouble with regard to efficient lighting in weaving sheds, because it was to the employer's advantage; but he did not see how it would be possible to fix a standard.

Mr. *Thomas Shaw*, Secretary to the Colne District Weavers' Association, and representing the Amalgamated Weavers' Association, stated that during the last few years there had been considerable improvement in the illumination of weaving sheds; and there was still room for more. The lighting generally had been improved, owing to the introduction of the incandescent mantle. There was very little electric light. Factory inspectors should have power to insist on an adequate light. He believed this was the only solution. The work differed so much that it would be impossible to fix any hard-and-fast rule. One light to four looms he considered inadequate.

The CHAIRMAN: Suppose we came to the conclusion that a certain definite amount of light was necessary, and then suppose we provided that on every part of the work not less than this amount of light must fall?

Witness: That will be perfectly satisfactory.

Mr. *W. C. Robinson*, the Secretary of the Amalgamated Society of Beamers, Twisters, and Drawers, said that incandescent gaslight might fairly be called satisfactory. As to electricity, there were various opinions; but he thought the general idea was that it was the best, so far as his workers were concerned. He would like some provision which would make it practicable to illuminate the whole of the work satisfactorily; and this was possible.

Mr. *A. Hutchison*, Secretary of the National Union of Stove Grate, Fender, and General Metal Workers, asked whether he thought it would be possible to make regulations which would secure that more light would be available where it was wanted, said he believed that in most cases it was a matter of expense. He handed in a list of practical suggestions for improving the lighting. It was his opinion, he added, that a standard of illumination could be fixed. In foundries, the worst-lighted parts were where the moulders worked.

COAL TAR AND ITS PRODUCTS.

Last week there was reproduced from the "Iron and Coal Trades Review" an article on this subject that has called forth a letter from a correspondent, writing under the *nom-de-plume* "Distillation," who says he "has no desire to 'wet blanket' any efforts being made to retrieve the chemical trade which has been largely in the hands of our enemies, but thinks many of the statements in the article are exaggerated and misleading, and should not be allowed to pass unchallenged."

Having mentioned that he read the statements made in the article with "interest and amazement," he proceeds: It is stated that the results given under various heads have been obtained under everyday conditions, and have been amply substantiated in plants actually at work. As the figures and data have been supplied by Messrs. Hird, Chambers, and Hammond, of Huddersfield, it may not be too much to ask where the plants are at work, and if permission can be obtained to view them. The figures given as to quantities of products, prices, and profits, are, in the opinion of the writer, quite different from what other tar distillers can obtain.

For example, is it an everyday condition to obtain 26 gallons of light oil from one ton of tar? Can the prices of the various oils as given in the first estimate in the second column of the article be obtained at any works at the present time? With regard to the quantities of benzol, toluol, &c., are these calculated, or are the quantities based on actual results?

The rectification of benzols may be a simple process; but to rectify to the War Office specification certainly requires more attention in supervision "than is obtainable from men who have no previous experience in distillation."

The article states that, on 60,000 gallons of benzol, the working charges would be £279. This is, roughly, 1d. per gallon. The writer knows this to be an absolute impossibility with sulphuric acid and caustic soda at their present prices.

The most startling statement, however, is that with regard to crude carbolic and cresylic acid—viz., that one ton of average tar contains 3 gallons of each; and that "a very simple type of plant" is required for the recovery of these products. It would be most interesting to have further particulars of this simple type of plant, and where it may be seen in actual operation. The writer suggests that if 1½ gallons of saleable carbolic acid are obtained from a ton of average tar working under everyday conditions, the results may be regarded as being satisfactory.

The object of the statement of the results based on prices ruling in 1913 is difficult to understand. The war has upset the prices of all tar products. Tar is difficult to sell at anything over 12s. per ton; and huge stocks of pitch have accumulated in the country, for which it is difficult to get £1 per ton.

GERMAN CONTINENTAL GAS COMPANY.

Report and Accounts for the Year 1914.

The following is a summary of the contents of the report for last year of this Company, whose head office is at Dessau.

The issue of the report has been delayed owing to the difficulty of obtaining early information of the position of the Company's undertakings in hostile countries. The quantity of gas sent out from all the Company's works in the year was 98,085,273 cubic metres [about 3,463,981,400 cubic feet], which is 0·82 per cent. less than in the previous year. The reduction is solely due to the falling off in gas consumption during the last five months of the year, after war had broken out. The increase in expenses caused by the war reduced the gross profit to 4 273,213 marks [about £209,470], as compared with 4,688,509 marks in 1913. It is proposed to pay a dividend at the rate of 8 per cent.; to assign 1,250,000 marks to the renewal fund, which has been drawn on much more heavily than in the preceding year; and to create a new war provident fund of 230,000 marks.

The falling off in gas consumption which occurred at the beginning of the war subsequently vanished—largely owing to the scarcity of petroleum; but it is anticipated that many of the new gas consumers thus obtained will continue to use gas after the war is over. Unfortunately, scarcity of fitters has prevented new connections being made as quickly as called for. Coal has been dearer than in 1913, and after the outbreak of war often inferior in quality. Bye-products, especially coke, have given lower returns. The central workshops at Dessau have been utilized for the manufacture of munitions, for which their equipment was admirably adapted, and thus the whole of the workmen engaged there have been kept in employment at good wages. The interest held by the Company in other undertakings had been largely increased the previous year; and though these undertakings in Germany were affected by the war, their development would not suffer, and they would make good profits on the return of normal times.

In consideration of the introduction of a "flat" rate for gas at Frankfort-on-the-Oder, the Company had obtained an extension of their concession there by twenty years—viz., until the year 1940. The apparatus (tar-extractors, scrubbers, exhausters, &c.) at the Company's Dessau works was overhauled during the year and extended to a capacity of 1,765,000 cubic feet per diem. The former municipal gas-works at Odessa, which had just been taken over by the Company under a concession, showed an increase in output during the early part of the year; but since the outbreak of war there had been no direct information in regard to the works. The Company's various electricity works made good progress; and the supply of current was undertaken in the districts round Nordhausen and Elbgau, in which the Company have already supplied gas. After the outbreak of war, however, the State embargo on copper hindered the further extension of the electrical undertakings of the Company.

The increase of the capital of the Company to 28,200,000 marks [about £1,382,350], decided upon at last year's general meeting, was carried through, and the new shares to the amount of 4,200,000 marks receive the full dividend this year. The issue of bonds to the value of 6,000,000 marks, authorized in the previous year, was not proceeded with, owing to the outbreak of war. No fewer than 523 officials and workmen had been called to the colours from the Company's German works by the end of the year.

The report adds that since the beginning of the current year there have been increases in gas consumption, as compared with the corresponding months in peace-time, and that the returns from bye-products have improved. The difficulties in obtaining supplies of coal have, however, grown, and the considerably higher prices which are being paid must affect adversely the results of the current year's working, as the Company must abstain from raising the price of gas in view of their obligations to the public at the present time. The Company's gas and chemical works at Warsaw were sequestrated by order of the Russian military command on Dec. 22 last, but were restored to the Company by the German Government on Aug. 22, and have since been worked by it. They were in good condition when handed back in August.

DANISH GAS COMPANY.

The Annual Meeting (the 61st) of this Company will be held in London on Thursday, when the Directors will report that the net revenue for the year to June 30 was £66,673. Adding the £61,280 brought forward from the last account, the total credit to the profit and loss account is £127,953. After charging the debenture interest and loss on exchange, which is said to have been exceptionally heavy, and setting aside £10,000 to the reserve and redemption account, there remains £104,264 available for dividend. Interim dividends of 2½ per cent. on the preference shares and 5 per cent. on the ordinary shares have already been paid; and the Directors will recommend that there be declared dividends of like amount on the respective shares. These dividends will amount to £43,500, and will leave a balance of £60,764 to be carried forward. There was charged to capital account during the year, for additional buildings, apparatus, mains, &c., £24,068.

As stated in the last report, the Company's business is suffering financially from the effects of the war—especially as regards its supplies of coal, material, &c. There was a decrease of 3 per cent. in the gas sales, as compared with the previous year, although the number of meters fixed on June 30 last was 2074 more than on June 30, 1914. The Flensburg works of the Company have not been interfered with beyond the appointment of a Controller by the Prussian Government to regulate the Company's local finances, &c. The Company's relations with the town authorities are, as usual, quite satisfactory.

The report of their Engineer and General Manager in Denmark (Mr. A. W. Edwards) mentions that the total gas consumption was 1,082,337,000 cubic feet, against 1,116,250,000 in the previous year—being a decrease in the consumption of 33,913,000 cubic feet, or 3 per cent. This decrease was caused by the European war. It was especially during the quarter ended September, 1914, that the consumption

decreased considerably. With the exception of Frederiksberg, where there is still a falling off, as compared with the previous year, the stations have, during the last few months, gradually worked up to about the normal output. The Flensburg station is still in the hands of the Company; but the Prussian Government are controlling the business. This does not, however, interfere with the management. The new holder at Odense has been completed and taken into use. The consumption in the St. Hans district is increasing satisfactorily, and new trunk mains are being laid. A new trunk main is being carried through part of the town of Elsinore, and a new retort-house will probably be built in the course of next year. The new naphthalene washer referred to in the last report has been fixed and taken into use at Viborg. The consumption at Assens is progressing satisfactorily. The mechanical plant in connection with the vertical-retort house at Strandvel has been completed and is working to satisfaction. The gas-producing plant needs extending, and the foundation for the extension has been commenced. A new gasholder is being erected here. A new naphthalene washer has been fixed at Frederiksberg and taken into use. The extension of the Ribnitz works is nearly completed, and all the new apparatus has been taken into use. This station is in good order, and the works quite undisturbed by the war. The Horsholm station is progressing satisfactorily. The prices for tar and ammonia products have been lower during the last year, but the price of coke has been good. All necessary alterations and repairs will be completed before the winter, Mr. Edwards concludes by stating, and the stations will be in good working order.

THE FATAL EXPLOSION AT BECKTON GAS-WORKS.

Inquest.

At the East Ham Central Hall last Tuesday, Dr. COLLINS, the Deputy-Coroner, held an inquest with reference to the death of Jacob Francis, aged 29 years, a stillman's assistant, who was fatally injured at the products and chemical works of the Beckton Gas-Works on Monday morning of last week [*ante*, p. 159].

Mr. BEASLEY ROBINSON appeared on behalf of the Gas Light and Coke Company; and Mr. BUTLER, one of H.M. Inspectors of Factories, represented the Home Office.

The CORONER said that some benzol was being removed from one of the drums when without any warning some fumes were seen to be coming away from it, and there was an explosion. The question was as to whether this was a case of spontaneous combustion, and whether it was necessary to take precautions in the way of electric torch lights, preventing smoking, and so on. There was, unfortunately, no one alive who could give any explicit details as to the affair, and they would have to do the best they could.

Henry Francis said he was in the same employ, and was practically doing the same work, as his son, the deceased. He did not consider the work was dangerous so long as it was carefully carried out. He saw the remains of the body in the mortuary and identified them as those of his son.

Frederick Paine, foreman of the department where deceased was employed, said deceased worked under the supervision of a man named Morris, who was experienced. The department was in perfect running order when he left it at 9.50 p.m. on Sunday evening. There were rigid rules as to carrying matches or smoking. The men themselves knew they were liable to be blown to atoms if they did so. The place was fitted throughout with electric lamps, and the men were provided with electric hand lamps. He had never heard of a bulb breaking there or anywhere else; and if it did, there would not be sufficient vapour to explode. The explosion took place at 3 o'clock in the morning, and the benzol was running into the drums. The drums were of 50 gallons capacity, and took about three hours to fill. There was a naked stream from the retort into funnels and thus into the drums, which was the usual process. There should be no vapour from the taps, as the condensation was so good. The liquid would be so cold that no vapour should arise, and there would be practically no smell. He could give no reason at all for the explosion, not even by a leak from the retort. The lid was never lifted except for cleaning purposes. From time to time the drums were inspected to see that they did not overflow; but samples were not taken at that particular time. All the electrical fittings were outside the plant house; so that there was no chance of a fuse blowing out on the switchboard. To his knowledge all the joints and the machinery were tight and sound.

By the FOREMAN: The whole of the men wear their own clothes while at the work. The floor is of concrete.

The CORONER: Then there is a possibility of a spark from a nail from a boot?

The CORONER'S OFFICER: The witness is mistaken, the floor is not concrete.

In reply to the CORONER, witness said he had no idea where the explosion originated.

By Mr. BUTLER: Portable hand lamps were the only ones used in the buildings. To see how the drum was filling, the funnel would be removed; and the inside of the drum could be seen by the electric light above. A hand lamp was not necessary.

By a JUROR: He had heard of cases of drums being overfilled. When they lifted funnels they did not take them right out, so that there was no chance of any drips falling; they could see without that.

Mr. *Gordon Adams*, the Works Manager at the Beckton Gas-Works, said that, so far as he knew, everything was in working order. Usually he went round every day, but he had not been round this particular spot on the Sunday. There were 80 acres of works, and it was rather an extensive job. The plant house employed was the usual, and had been in use for the past 35 years. Machinery had been altered from time to time. He had never heard before of a fire or an explosion. The floor was of concrete, with wooden gangways, simply for the convenience of moving the drums.

In reply to the CORONER, witness said he did not think that rolling the drums on the concrete would cause a spark. It was possible, but he had never heard of it. He had no idea of the cause of the explosion. He had tried to find out by an examination of the building, but it was too badly damaged by the fire to give any clue. The still was quite perfect; so that it was proved the explosion was caused in the building.

The CORONER: Would it be possible to cause the explosion by malice, by an incendiary?

Witness: It would.

By a match it could be done, I suppose, or a spark?—Only if the vapour was there.

Replying to further questions by the CORONER, witness said that this benzol was low-flash, and would have to be set fire to by a match or a spark—it would not be caused by spontaneous combustion. All the electric lamps were enclosed in double glass cases, and the wires were in steel cases, as were also the leads. The vapour would not be able to be seen; it would not be of sufficient density. Anyone who spoke of seeing vapour must mean steam. Thousands of drums were filled in exactly the same way as this.

By a JUROR: The nearest naked light to the drums was 35 feet away. He was not aware that it was actually burning at the time. The stills were all covered with non-conducting material. There was an ample supply of water for the Fire Brigade; there were ten hydrants on the fire almost immediately.

By the CORONER: There was a gas-stove in the fire station 35 feet away; but if the wind was blowing from the stillroom in this direction it would be a long way for fumes to be carried.

Chas. Morris, a stillman, was then called. He said they had never had a better night for the stills; everything was going splendidly. At 5 minutes to 3, witness's mate, the deceased, was in the benzol stores with him. He looked in the drums and saw one wanted 3 inches, another 9 inches, and a third 12 inches. Witness then went to look at another still in another house, and had just got back when there was a tremendous explosion at the far end of the room, which seemed to start at the bottom of the wall and blow up to the top. There was a dull, heavy boom as the explosion occurred. This was not a serious explosion; it was what happened afterwards that caused the damage. Realizing the dangerous nature of the stuff, he called to his mate to get out, and they ran out together. Deceased rushed towards the fire station, while witness turned to the right and called to the boilerman to "shut off all against us." Then there was another terrible boom, and the whole place blew up and all the material was flung over the yard. Witness turned his back to the building, and dropped on his knees, which saved his life; but even then he had his coat burned off his back, and all the hair off the back of his head.

In reply to Mr. BUTLER, witness said if they desired to make a cup of tea they used a steamer, which was the same heat as was used for the distillation of the benzol. The first explosion caused the largest still to be dismantled, which directly after exploded. This could not have occurred unless there had been a fire to explode it. He was quite sure his mate had no light in his hand at any time.

A JUROR: If there were a leak would you smell it?

Witness: Yes, at all times. We should notice it and find it, otherwise the stuff would get down the drain and cause trouble; it is my job to look for leaks.

John David Harris, a fireman in the employ of the Gas Light and Coke Company, stated that he was on duty on the night in question, and heard an alarm given. On going out he met Morris, who said there was something wrong with the benzol. He said he thought it would be all right, and seemed to think it was a matter of a leak or a burst. He did not appear to think the danger was over, but witness understood him to mean that it would be safe from fire. Witness cautioned him as to the fumes from the benzol, as on the floor of the plant house, or about 6 inches above it, he saw what looked like a steamy vapour, which he was sure was not smoke. At the time the electric lights were full on. There were plenty of smoke helmets and respirators ready to hand had they been required. Next there was a hissing, rushing noise, which was followed by a terribly loud explosion. Witness saw no flash. He was thrown to the ground immediately. He realized on getting to his feet that the benzol had exploded. The concussion of the explosion set the electric fire-alarm bells going, and the fire brigade got to work. A few moments after he found the deceased man's mangled body. Some years ago there was a slight fire in the benzol store.

By a JUROR: He only heard the one loud explosion. There was no benzol running about alight that he saw, either inside the place or outside. There was a drain it would run down.

By the CORONER: It was the building itself that was alight; while the benzol was running over from the top of the towers as the distillation was put out of order.

By Mr. BUTLER: He had never before seen the steamy vapour that had been referred to.

Dr. *John Guest* said he was called to the deceased, and found him charred from head to foot; all his clothing had been burned off him. He must have been in the midst of dense flames, and death was due to shock.

Chas. Morris, recalled, said he filled the still by a steam-pump. As a fact the still had been filled before he arrived on the Sunday, and the carbon bisulphide had run off. If the steam-pump or the valves had jammed, then the benzol would run off into the receivers or the drums; and it was his duty to see that there was no mistake.

The CORONER said that was all the evidence he proposed to call, and it was for the Jury to find a verdict as to whether or no everything was as it should have been, or anyone was to blame.

The Jury returned a verdict that the deceased died as a result of shock from an explosion of benzol, but there was no evidence to show how the explosion occurred.

The CORONER: You can find nothing to lead up to it?

The FOREMAN: No, sir.

The new season's gas-fittings catalogue of Messrs. J. & W. B. Smith, of Farringdon Road, E.C., offers a very wide selection of lamps, pendants, burners, mantles, globes, and sundries. A number of well-known patterns of inverted burners and shop and outdoor lamps are included in the list; and the glassware illustrated is of all kinds and suitable for all purposes.

BIRMINGHAM AND ITS GAS SUPPLY.

Appeal for Economy by Gas Consumers.

Last Tuesday's meeting of the Birmingham City Council had to deal with the report of the Gas Committee (given in last week's issue of the "JOURNAL"), which afforded Alderman Sir Hallewell Rogers an opportunity to appeal to consumers to economize in the use of gas during the forthcoming winter. With their help, he said, the Committee felt that the abnormal demands would be met without any interruption.

Sir HALLEWELL ROGERS moved the adoption of the Gas Committee's report, which it may be remembered contained a recommendation instructing the Finance Committee to obtain sanction to the borrowing of £35,000, part of a loan previously granted and now required for further carbonizing plant. The abnormal increases in the output, he said, rendered absolutely necessary the extensions of plant proposed at the Nechells works. With the high prices prevailing for all materials and labour, the Committee naturally desired to postpone the placing of the contracts till the latest possible date; but the abnormally heavy demands that were now being made for gas, which were beyond all anticipation, rendered it absolutely necessary that the extensions should be ready for the winter of next year, and, having in view the possible delays which might occur in the supply and erection of materials (consequent upon the uncertain state of the market), the Committee felt that the contracts should be placed immediately, in order to ensure the whole of the plant being in operation by October, 1916. The filling-up of No. 2 retort-house at Nechells was merely the completion of a scheme which came before the Council so long ago as February, 1898; but, owing to the increased output of gas obtained from the other works of the department—due partly to the renewals of old plant and to the increased yields of gas per ton of coal carbonized—the Committee had, fortunately, been able to delay the installation of the final portion of the plant then obtained for Nechells, and had thus spread the expenditure of the amount sanctioned over a very much longer period than was at the time thought possible. The Council would realize the effect on the productive capacity of the increased yield of gas per ton of coal when he told them that for the year ended March, 1902, the average yield of gas per ton of coal was approximately 9800 cubic feet; whereas during the year ended March, 1915, it was 12,000 cubic feet—an increase of 22 per cent. In view of the fact that the extensions proposed were rendered necessary by the extraordinary demand for gas by munition contractors, the Committee did not anticipate any difficulty in obtaining the necessary authority from the Government departments. Practically, every Government contractor in the area supplied by the Department was dependent on the maintenance of the gas supply to enable him to fulfil his contracts. Apart from engines, a number of gas-heated furnaces for the melting of metals had been installed in the various munition factories, and were being used night and day throughout the district.

Continuing, the Chairman said that the Committee were fully alive to the difficulty of giving a full supply of gas in all these circumstances during the next winter; but they anticipated being able to do so. Everything depended upon factors which were, to a large extent, beyond their control. The first of these was the great scarcity of suitable labour at the gas-works; and then there was the question of coal supplies. The gas consumers generally could help the Committee in the matter of economizing as much as possible the use of gas. With their help in this direction, the Committee felt that the abnormal demands would be met by the Department without any interruption. Some people thought that the diminution of public lighting must have had some effect upon the supply of gas. The figures for the half year ended Michaelmas showed a decrease for public lighting of 44 million cubic feet for the six months, which was something like 2 per cent. of the output—certainly not more, although, of course, in shop lighting there had also been a decrease.

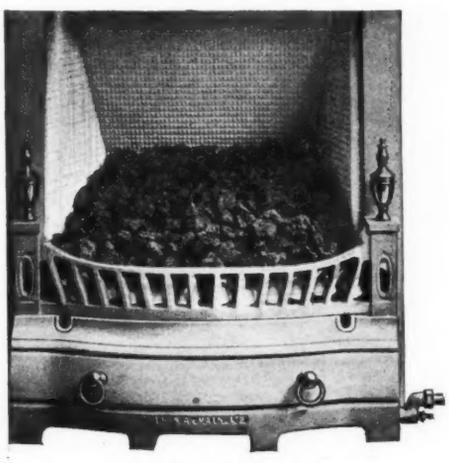
Referring to the remarks of a member earlier in the meeting, with regard to the price of coal, Sir Hallewell said some rather unfair deductions were made. He had explained to the member in question that it was very difficult to compare the figures, and that they were going to pay probably £160,000 to £200,000 more this year than last year, because they were not buying the same quality of coal. The London companies, owing to the fact that they were unable to get coal by water, came into the Midlands for it; and the result was that the prices of coal went up. But the Committee were buying, in many instances, a very much better quality of coal; and therefore they were getting more gas out of it, and were obtaining more for their tar, liquor, and coke. It was hardly fair to take the one figure and then compare it with the other. The Gas Committee did not buy the same coal every year, and comparisons of money were only too apt to mislead. In giving the figures, Sir Hallewell Rogers made it quite clear that no account had been taken of the quality of the coal. Their coal was costing at least 4s. to 5s. a ton more than last year; but it was not always the same coal. In many instances it was better coal; and therefore they were getting something more from it than when they were paying 4s. a ton less. Therefore it was very misleading to give figures of this kind.

The report was adopted.

A CONTRACT AND STORES COMMITTEE SUGGESTED.

Later on in the same sitting, Mr. Gaunt moved the following resolution: "That the General Purposes Committee be instructed to report at an early date as to the desirability of forming a Contract and Stores Committee for the purchase of all stores which are common to several committees." The formation of such a Committee, he maintained, would result in a very great saving in expenditure. Articles which were to be purchased could be standardized, and proper expert exami-

THE MAIN GAS FIRES.



The ST. NICHOLAS.

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The Gas Fire without a rival.

The new booklet—"Main Reflections"—contains particulars of several new Gas Fires. Copies free on application.

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

nation could be arranged. Their orders would be large enough to enable them to go direct to the manufacturers, instead of to the dealers. Large manufacturers had repeatedly refused to tender for the comparatively small quantities of articles required by one committee. It would also mean an encouragement to local manufacturers; and the fair-wages clause could be better enforced than at present. At the present time the Birmingham Council had fifteen committees purchasing the same commodities. The Gas Department purchased every year hundreds of thousands of pounds' worth of coal. On the other hand they had fifteen committees each purchasing smaller quantities, at various prices; and it seemed advisable that the one expert who bought this large quantity should also buy, or advise in the buying of, the other fourteen committees' requirements. The resolution was carried.

CHELTENHAM GAS-WORKERS' STRIKE.

Board of Trade to Arbitrate.

Recently a hundred of the employees of the Cheltenham Gas Company struck work, as the result of the Company refusing to concede an advance of 3s. 6d. a week to them as a war bonus. All branches of the workmen were concerned in the strike. Last Saturday week public notice was given by the Company that, "owing to the sudden strike at the gas-works, and the scarcity of labour available to keep up the supply of gas, the Directors regret that they may be compelled temporarily to close-down the works until sufficient hands can be obtained or the men return to work."

The recognition of the men's Union is one of the questions on which there is a difference of opinion. In a statement to the Press, Mr. James Paterson (the Engineer and Manager of the Company) said that a short time ago an application was put in by the Amalgamated Society of Gas Workers and General Labourers on behalf of some of the men, for payment of a war bonus to all the Company's workmen other than lamplighters. This application was a distinct contravention of the mutual agreement come to in January last, and should have been laid before the Engineer privately by the workmen or a deputation. More recently, personal applications were made by a considerable majority of the workmen for a war bonus; and these, after due consideration, were in all cases granted by the Directors.

At a meeting held on the Saturday morning, the Company decided to instruct the Engineer to inform the men that they were willing to accept the arbitration of the Board of Trade, if the men would go back at once. Councillor H. Simpson, of Birmingham (the General Secretary of the Society), during the afternoon interviewed Mr. Paterson at the works; and there and then arrangements were come to that the whole matter should be referred to arbitration—all the men to be reinstated in their former positions. The Strike Committee having met eventually decided to adopt this course and suspend the strike; and the men resumed work on Sunday week at 2 p.m.

MANSFIELD GAS AND WATER UNDERTAKING.

Resignation of Mr. W. J. Rendle Baker.

Mr. W. J. Rendle Baker has tendered his resignation to the Mansfield Corporation of his position as Engineer of the town's gas and water undertakings. The matter was brought under notice at the last meeting of the Council, on the 15th inst., under the presidency of the Mayor (Alderman D. H. Maltby), when a letter was read from Mr. Baker and referred to the Gas Committee. In moving the adoption of a report of the Committee, the Chairman (Mr. T. Smith) said the time was not opportune that night for going into the Auditor's statement in relation to the undertaking. It had first to come before the Council in committee; and they all knew the reason why he did not propose to make any comment upon it at present. The Committee's report was adopted.

In subsequently moving the levying (which was agreed to) of a district rate of 1s. 11d. in the pound, the Mayor alluded to the adverse effect upon the municipal financial position of the inability of the Gas Committee, owing to the past year's working of the undertaking, to pay over the sum of £1500 which it had been estimated they would be able to contribute in relief of the rates. He referred, however, with gratification to the circumstance that the two other Corporation trading concerns, represented by water and electricity supply, had come to the assistance of the Finance Committee in a splendid way. On behalf of the town, he congratulated the Water Committee on contributing a further sum of £500 (making the total of £2500 available towards the rates for the year); and the Electricity Committee for granting an additional £1000, making £1600 in all out of a profit made by them last year of £1900.

WAGES ARBITRATION AT COATBRIDGE.

An Interesting Award.

The recent strike among the stokers at the Coatbridge Gas Company's works ended in the men returning to work pending their demand for 3d. a day increase in wages being referred to an Arbitrator. Bailie Robert Irvine, one of the local Magistrates, was chosen to arbitrate; and he heard evidence and arguments by Mr. Graham Hunter (representing the Company) and Mr. Peter Campbell (Organizing Secretary of the Municipal Employees' Association) on behalf of the men. He has now issued his award, which has some features of general interest, and which is as follows.

Before dealing with the basis upon which my decision is given, several observations regarding statements submitted by Mr. Graham

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Hunter and Mr. Peter Campbell, when we met to hear evidence, might be made.

As to Mr. Campbell's contentions. (1) I cannot consider that the striking of men comes within the scope of arbitration, as in most of his arguments Mr. Campbell contends for a comparison between Coatbridge and other gas-works, where working conditions are as nearly as possible similar. (2) For the same reason, while admitting that the cost of living has increased, Coatbridge is not unique in this respect; and if a comparison is to be made, and other towns are similarly placed, it can have no influence on the question to be decided. (3) The influence on wages where men are organized comes under the same category, when the whole of the conditions are to be taken into consideration. In any case, the gas-works in the towns of Airdrie and Motherwell are municipal undertakings, which in a great measure, if not entirely, balances any difference which might be claimed to issue from organization, or the lack of it.

As Mr. Hunter in his evidence dealt principally with matters of fact quite open to investigation, and which will be dealt with when a comparison comes to be made between Coatbridge and the other places I have visited, the only remark I would make is that I entirely agree with him, as a result of my own observation, when he asserts that the physically best class of men are to be found in Coatbridge.

In Airdrie, Coatbridge, and Motherwell the number of hours worked are the same—viz., 13 hours. The number of holidays are the same in Airdrie and Coatbridge—viz., 7.

—	Airdrie.	Coatbridge.	Motherwell.
	Tons Cwt.	Tons Cwt.	Tons Cwt.
Quantity of coal handled per man per shift . .	2 16	2 15	2 2
Retorts per man per shift	12	24	16
Weight of charge . .	About 4½ cwt.	About 2¼ cwt.	About 2½ cwt.
Wages	5s. 9d.	6s. 3d.	Different wages paid—3 at 6s., 3 at 5s. 9d., rest at 5s. 6d. Average, say, 5s. 9d.

The foregoing are matters upon which there is no room for difference of opinion, as I have personally verified them on indisputable evidence. The question now arises, What are the factors for and against the granting of the 3d. in dispute?

(1) Taking the case of Airdrie, the quantity of material dealt with is practically the same as in Coatbridge; while the wages paid are 6d. per day less in Airdrie. But, in my opinion, this difference is fully balanced as follows: Only 12 retorts are dealt with in Airdrie, as compared with 24 in Coatbridge; and in the latter case more work is entailed in the opening and luting-up of doors, and there are two operations in disposing of the same amount of material which in Airdrie is done in one operation.

(2) In Airdrie, cleaning of fires is only performed once in 24 hours, except in exceptional circumstances, when material is very dirty. In Coatbridge, fires are cleaned every 12 hours.

(3) While I felt that, for the purpose of abritration, it was unfair to consider the points submitted by Mr. Campbell to which I have alluded, there is a factor which, in my opinion, should be taken into consideration. That is, what rent a man has to pay for accommodation suitable to his position. I am convinced that, on an average, the rents of houses such as stokers, &c., occupy are 7 to 8 per cent. cheaper in Airdrie than in Coatbridge; and though rates are slightly higher in Airdrie, this is balanced by the lower rates.

Another point is the distance the coke has to be wheeled in the open air after being cooled. The average distance in Airdrie is 40 yards at most, while in Coatbridge it is 2½ to 3 times this distance; and the longer distance, in my opinion, not only entails more physical exertion, but is likely to offer greater opportunities for men catching cold when perspiring freely as stokers do. Taking all factors into consideration, my opinion is that the Coatbridge men, despite the 6d. extra per day, are not quite so well placed as are the stokers in Airdrie.

Then, as compared with Motherwell, in Motherwell the quantity of material dealt with is 22½ per cent. less than in Coatbridge. Wages are, however, 8 per cent. lower. Each man has 16 retorts of 2½ cwt., as against 24 retorts of 2¼ cwt. in Coatbridge. There is (but to a lesser degree in Airdrie) a saving of work consequent on the opening and luting of doors. It is clearly understood in Motherwell that the maximum amount that each man will deal with per shift shall not exceed 2 tons 2 cwt. Fires are cleaned twice in 24 hours, as in Coatbridge; distance to wheel coke, 30 to 40 yards; ten holidays per annum [one of which is a Sunday, but as full Sunday work is carried on the whole year it means ten working days]. Then, as to other conditions, rents and rates are largely the same as in Coatbridge, particularly so as regards working men's houses. I do not think that there is very much difference between Motherwell and Coatbridge.

After very carefully comparing the three towns visited, and in which stoking by hand is carried on, I have come to the conclusion that some slight increase on present wages should be granted to the stokers in Coatbridge. I must confess that I had some difficulty in fixing the amount. However, I am convinced that 3d. per day increase would put the Coatbridge stokers, all things considered, in a relatively better position than the stokers in the Airdrie and Motherwell Gas-Works. I would note, however, that apart from opinions as to the wisdom of, or necessity for, Sunday work, the men in Coatbridge are deprived of the extra remuneration paid for such work once in every three weeks, which amounts to about 3s. 11½d., or over 1s. per week.

As full-time Sunday work prevails in Airdrie and Motherwell, I am of opinion that 2d. per day increase should be granted to the stokers employed by the Coatbridge Gas Company, as from June 6, 1915, and decide accordingly.

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EATON IN ANOTHER GUISE.

Proceedings took place at a recent sitting of the Haywards Heath County Court which it is hoped by our contemporary "Truth" the Adjutant-General will give his attention to; the fact having been brought out that two officers of the 4/9th Battalion of the Middlesex Regiment are old ornaments of the financial section of that paper's "Cautionary List." It appears that one of these officers, Lieutenant H. Hollis, was sued by a local firm for £17 for hire of motor cars, work done, and goods supplied. The lieutenant denied his responsibility—suggesting that the gentleman responsible for the debt was Colonel Edmund Eaton, "now his commanding officer in the Army, and formerly his employer in the businesses which earned both of them niches in 'Truth Cautionary List.'" Some of the orders received by the plaintiffs were in writing, and signed by Hollis; but his explanation was that he signed these on the instructions of Colonel Eaton, though the cars were for private trips. Colonel Eaton, on the other hand, repudiated liability, and did not attend the Court. The evidence of a sergeant showed that a house called "The Meads" was known as the officers' mess, though there was no mess. Practically, Colonel Eaton lived at "The Meads," and ran it; but, it is added by our contemporary, "furniture, linen, &c., were borrowed for use in this establishment, and debts to tradesmen incurred, on the representation that it was the 'officers' mess.' Hollis signed an order for the water supply, as President of the non-existent mess, but repudiated his liability, and only paid the rate after being summoned before the Magistrates." In giving judgment, his Honour Judge Mackarness found that liability could only be fixed on Lieutenant Hollis for certain items amounting to £10 10s. 6d.; but he made some strong remarks regarding the non-appearance of Colonel Eaton in a matter where his name figured, and where "very serious allegations of dishonourable conduct were made."

Commenting upon the case, "Truth" says:

> For years Edmund Eaton has been notorious as a company promoter and share-pusher who, by means of flagrantly deceptive prospectuses and circulars, has involved unwary investors in heavy losses. In these schemes, Hollis has frequently figured as director, manager, or secretary; being also variously described as "a stock and share broker," as a "surveyor and estate agent," and as a "C.E." What are known as the "Eatonesque" enterprises have generally come to an end without unpleasant consequences for anybody but the victims; but a year or two ago Eaton and others were indirectly brought to book for a particularly impudent attempt to impose upon the public. A prospectus of a wretched concern styled the South of England Natural Gas and Petroleum Company was issued, bearing, immediately under the title of the Company, the names of Lord Fisher and his eminent colleagues of the Royal Commission on the Fuel Supply of the Navy; the object evidently being to lead the public to suppose that they were associated with the Company. The *suggestio falsi* was conveyed so skilfully that the Public Prosecutor came to the conclusion that its authors could not be proceeded against ont hat ground. But they were summoned for issuing the prospectus without an imprint; and on this technical charge Eaton was heavily fined. One would not recall these matters if Eaton and Hollis, having somehow got Commissions, were now conducting themselves as officers and gentlemen. But the case at Haywards Heath—only one of several in which tradesmen have been similarly treated—indicates that they have carried into military life the same laxity of principle which marked their doings as civilians; and for the honour of the army, steps should be taken to prevent the possibility of further scandals of the same kind.

STREET LIGHTING AT RICHMOND.

There was a long discussion at the last meeting of the Richmond (Surrey) Corporation upon the respective charges of the Richmond and the Brentford Gas Companies. The question cropped up on the report of the Highways Committee referring to the street lighting accounts for the June quarter, which stated that the Committee had received and considered the explanations of the two Companies as to the deductions made for unlighted lamps. These explanations had been accepted by the Committee and the accounts passed for payment.

Mr. TOWERS said that the charge of the Richmond Company was 7s. 2½d. per lamp more for the Lady day quarter than that of the Brentford Company; and they now wanted to charge for the Midsummer quarter 10s. 2½d. more per lamp lit. Taking the lamps at normal times, the difference between the Brentford and Richmond Companies was 1s. 5½d. per lamp per quarter. The recommendation was misleading, as the Richmond Company had never given any explanation. They stated that they would adopt the same system as the Brentford Company; and the Council's Accountant told them that, if the Brentford Company's reductions were to be applied to the Richmond Company, the charges should be applied as from October, 1914. This called for a revision up to Christmas. Now the Richmond Company said they would not go into that. There was £85 more on the bill, and they had no explanation. He moved that the account should go back.

Alderman EDGAR suggested that the Highways Committee should consider the expediency of doing what was done in some districts—instead of lighting every fourth lamp and obscuring it, they should light each lamp, but reduce the light one-fourth.

Alderman SIMPSON said they had now had fresh instructions from the Commissioner of Police, which laid it down that they must have each lamp prepared for lighting in case of fog, and that in the side

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streets 75 per cent. of the lamps were to be lighted, instead of one-third as now. The matter of the account had been before the Committee on a great number of occasions, and they had done their best to get the price of gas put on a proper footing. In the first instance, the accounts were sent in and the Committee were told that the Brentford Company made a reduction of 26 per cent., and the Richmond Company of 24 per cent. The Committee thought that this was not a great difference, and the accounts were passed. He admitted that the Brentford Company's accounts were altered, and they allowed the Council more discount; but there was not a great difference on the percentage basis. The Committee, however, acted under a misapprehension. When the next quarter's accounts came in, they again took the percentage on the accounts submitted, and found that it was much less than the previous quarter; and, further, the amount of the allowance varied very considerably—the Brentford Company allowing them 8s. 4d. per unlighted lamp, and the Richmond Company 5s. 2½d. The matter was referred to a Sub-Committee, and a deputation waited upon the Directors of the Richmond Company, in order to try and come to some amicable arrangement to get the same reduction as was allowed by the Brentford Company. The result of the deputation was a letter stating that the Company were willing to allow off the account for the past quarter for the lamps unlighted the same sum as the Brentford Gas Company—8s. per lamp—and in future such allowances as were made from time to time by that Company. The Company, however, refused to allow the amount on the previous quarter, as they had paid their dividend, and could not re-open the matter. The next quarter's accounts came in; and the Committee found that the reduction made was 4s. 9d. per lamp by each Company. The matter was referred back to the Sub-Committee, who went into the question again and applied to the Gas Company to see how they made up their figures. The Brentford Company informed them that they made no charge for gas and allowed 4s. (as against 8s.) for maintenance, thus making a reduction of £1 7s. 2d. per annum.

After further discussion the amendment was lost, and the accounts passed for payment.

GAS AND GAS-METER TESTING IN CANADA.

A Modification of Requirements.

Embodied in the report presented by the Executive Committee of the Canadian Gas Association at the recent annual meeting in Montreal, was the text of a circular, dated July 8, establishing a new schedule of fees for the verification of natural and manufactured gas-meters and conditions as to the calorific and purity tests of gas. These were legalized by an Order in Council, on June 26, and abrogated Orders issued on May 12, 1905, and May 29, 1911. Some of the provisions are certainly novel so far as English conditions are concerned; and they may be of interest to many of our readers.

Verification of Tin Meters.

(Manufactured Gas.)

10 lights and under	$0·60
Over 10 lights up to 50 lights	1·00
Over 50 lights up to 100 lights	2·00
For every additional 20 lights or fraction thereof	0·50

Verification of Iron Meters.

(Natural Gas.)

No. 1 iron meter	$0·60
No. 2 ,,	1·00
No. 3 ,,	1·50
For each additional number	0·25
The fee for testing each proportional-flow meter—the owner to make the necessary connections, pay freight charges on testing apparatus, and travelling expenses of the inspector	10·00

Test of Calorific Power.

For each test of calorific power	$2·50

Purity Tests.

For each test as to the presence or absence of sulphuretted hydrogen if made at same time as calorific test	$0·25
For each separate or special test for sulphuretted hydrogen	1·00

Classification of Gas Companies.

The tests for calorific power shall be made in accordance with the number of meters in use, and at such times as are indicated in the following classification table:—

Class.	Number of Meters.	When Tests are to be Made.
1	Over 10,000	Daily except Sundays and holidays
2	5001 to 10,000	Three times weekly
3	2001 ,, 5,000	Twice weekly
4	1001 ,, 2,000	Weekly
5	1000 and under	Fortnightly

Certificates of calorific power tests are to be issued weekly to companies in Classes 1, 2, 3, and 4, and fortnightly to companies in Class 5.

Sulphuretted Hydrogen Tests.

Tests for the presence of sulphuretted hydrogen shall be made periodically as follows:

(*a*) Companies having more than 8000 meters, three times weekly. (*b*) Companies having less than 8000 and more than 4000 meters, twice weekly. (*c*) Companies having less than 4000 and more than 1000 meters, once each week. (*d*) Companies having less than 1000 meters, once fortnightly. Certificates showing the results of these tests shall be issued weekly to all companies except those coming under paragraph (*d*), in which case certificates are to be issued fortnightly.

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THE POWER OF COAL GAS.

One of the items in an excellent syllabus arranged by the Shipley Branch of the Workers' Educational Association was a lecture on the "Power of Coal Gas," which was given at the Shipley Technical School on Thursday, the 14th inst., by Mr. Matt Dunn, M.I.Mech.E., the Engineer of the Stockton-on-Tees Gas-Works. Mr. H. Blakey, the Secretary and Manager of the Shipley Gas-Works, was stated to have been responsible for the giving of the lecture; but he had arranged for the attendance of Mr. Dunn to take his place.

Mr. Dunn stated that he had been for 34 years connected with gas manufacture; and though he had been learning all the time, he knew comparatively little about gas. It was an immense subject; and they were only on the threshold of gas uses. Some years ago, when electricity was introduced, it was stated that gas would be run out of the field; but the fear had been entirely unjustified, and there was a greater demand for gas to-day than ever in the history of its manufacture. There was no illuminant which was so effective in withdrawing foul air from a contaminated atmosphere. The moment the gas was lighted in a room, a mighty current was set up, which effected immediate ventilation of the room. This was impossible by electricity. Gas was the exact reproduction of sunlight. Gas-fires had the same cleansing effect as sunshine, and did not cause a heated atmosphere, but a pure radiant heat. There was nothing superior to gas as an illuminant, if it was properly regulated with an air-adjuster. Nearly all the complaints with regard to gas lighting were due to neglect of this principle. Proper combustion could only be obtained by adequate infusion of air with the gas. The heating value of the gas was, of course, most evident in cooking, heating, and driving. For cooking, electricity could not come into competition with gas, because gas almost at any price was cheaper than electricity for the purpose. A unit of electricity would give 3440 B.Th.U. of heat; but 7 cubic feet of gas would give 3700 B.Th.U. The 7 cubic feet of gas were equal to a unit of electricity for heating purposes. Suction gas would be produced at 4d. to 8d. per 1000 cubic feet; but its calorific value was so low that, by comparison with gas produced at the gas-works, it was dearer. Mr. Dunn gave instances of the value of gas for gas irons and radiators, which were more economical and effective than any other system. He said gas at 4s. per 1000 cubic feet was cheaper than electricity for most purposes. Alluding specially to gas-cookers, he stated that the highest efficiency in gas cooking could only be obtained by proper air-regulators. It was to be regretted that people who had to operate the cookers did not know how to make the best use of them; and even with gas-fires the cost was greater than it need be. Mr. Dunn expressed his conviction that water could be heated by gas for baths cheaper than by any other means.

There was a very good exhibition of gas appliances arranged by Mr. Blakey and Mr. Dunn; and the audience were greatly interested in the explanations given. Mr. Dunn was thanked for his lecture.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Glasgow Corporation Gas Department arranged for an exhibition of gas-heated furnaces, which was open until the end of the week. It was made as representative as possible, so as to be of interest to all engaged in manufactures calling for furnace requirements, and particularly those on munition work. Many different types of furnaces were shown, including those for the heating of shell bodies and cases. Experts in the practical use of furnaces were in attendance to advise with respect to visitors' requirements; while practical demonstrations were also arranged for.

A settlement has been arrived at in an action brought by Alexander Nicol, of Edinburgh, against the North British Railway Company, for £500 damages in respect of personal injuries. It was stated by the pursuer that on March 6 last he entered the lavatory at the Craiglockhart Station, Edinburgh; and as it was dark, he struck a match with the intention of lighting the gas-jet. Immediately the match was lighted, a violent explosion took place; and he was knocked down and injured. Liability was denied by the defenders, who stated that they believed a prior occupant of the apartment had blown out the gas or turned it off and on again unknown to them. A payment has been made to the pursuer in full of his claim.

At the monthly meeting of the Coatbridge Gas Company last week, Mr. Alex. S. Legat, lately of the Carnbrae Iron-Works, was appointed Chairman of the Company, in room of the late Ex-Provost Sharp.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 25.

Pitch continues without change; the position still being dominated by the question of freight. In other tar products, the position continues firm; the current values being: Creosote, 4¼d. per gallon, in bulk; solvent naphtha, 2s. 1d. per gallon, naked; 48-50 per cent. anthracene, 2½d. per unit, casks free; 60's crude carbolic acid, 3s. 6d. per gallon for this year, and 3s. 4d. per gallon for next year, naked; pure toluol, 3s. 4½d. per gallon, naked—all at makers' works, net cash. There is, of course, not a free market in carbolic and toluol.

Sulphate of ammonia is in a strong position, and £14 15s. per ton, net and naked at makers' works, is reported as having been paid for 25 per cent. quality in large quantities over the next six months.

Tar Products in the Provinces.

Oct. 25.

There is practically no alteration in the markets for tar products. Business is still very quiet in pitch; and although quantities have been

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offered at reasonable prices, no business of importance is reported. Creosote markets remain quiet. Solvent and heavy naphthas are in good demand.

The average values of gas-works products during the past week were: Gas-works coal tar, 19s. 9d. to 23s. 9d. Pitch, East Coast, 19s. to 20s. per ton; Norfolk, Suffolk, and Humber ports, 18s. to 19s.; West Coast, 18s. to 19s. Manchester; 19s. to 20s. Liverpool; 20s. to 21s. Clyde. Benzol, 90 per cent., North, 10½d. to 11d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Coal tar crude naphtha, in bulk, North, 6½d. to 7d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2⅞d. to 3d. Heavy oils, in bulk, 3⅞d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 5d. to 3s. 6d. Naphthalene. £18 to £28; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. to 2½d. per unit; "B" quality, nominally ⅜d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Oct.* 23.

Throughout the week the market for this material has continued very firm, and higher figures have again been paid at all the ports. There has been a distinct improvement in the foreign demand, and this has added strength to the situation. The nearest values at the close are £15 2s. 6d. per ton f.o.b. Hull, £15 5s. f.o.b. Liverpool, and £15 7s. 6d. f.o.b. Leith. In the forward position, a good volume of business has also been done, and transactions have been reported at £15 7s. 6d. per ton f.o.b. Liverpool for November-December, and at £15 10s. f.o.b. Leith for January-June.

Nitrate of Soda.

This market is again firmer on spot, and prices have been advanced to 14s. 4½d. per cwt. for ordinary quality, and 15s. 4½d. for refined.

Sulphate of Ammonia.

From another source it is stated that the market for this article has remained very firm throughout the past week. Outside London, makes are quoted at £14 15s.; Hull, £14 12s. 6d. to £14 15s.; Liverpool, £14 15s. to £14 17s. 6d.; Leith, £14 17s. 6d. to £15; Middlesbrough, £14 15s.

COAL TRADE REPORT.

Northern Coal Trade.

There is a steady tone in the northern coal trade; and there is not much coal free for sale for the next fortnight's loading. Steamers are not now plentiful; and this keeps down the shipments, though some heavy cargoes of coal are being sent to French ports. Steam coal is well taken up, and is about 19s. per ton f.o.b. for best Northumbrians. Second-class steams are 17s. per ton; but where ready shipment is obtainable, slightly less may be taken in some cases. Steam smalls are, on the whole, steadier; and from 11s. 6d. to 13s. 9d. per ton f.o.b. is the current quotation, according to the quality and the time of loading. In the Durham coal trade, there have been some considerable sales which have stiffened the market. Best Durham gas coals are not plentiful, and command about 19s. per ton f.o.b. For second-class gas coals, the current quotation is from 16s. to 17s. per ton. "Wear Specials" are scarce at 20s. 6d. to 21s. 6d. per ton f.o.b.; but the price is in degree defined by the time of loading possible. A considerable tonnage of gas coal is being exported to the northern ports of France and to the Mediterranean; while there are tolerably full deliveries on the long contracts for our own gas companies. The rates of freight are higher—that from the Tyne to London with gas coal is from 9s. 6d. to 9s. 9d., and to Rouen up to 19s. has been paid. Shipping is scarce; and thus the high prices are paid, though some steamers are carrying coal on contracts at lower rates. At some distant ports, therefore, our fuel is at high and irregular values. Coke is steady. Gas coke is quoted at stiff prices—about 30s. per ton f.o.b. being the current quotation for good makes in the Tyne. This contrasts with about half that price a year ago; but both then and now the realized values to the producers were, and are, modified by the effect of the contracts at varying prices running. At that time also, it should be remembered that the market quotation for gas coal in Durham was probably 6s. lower than that which is now quoted.

Technical Instruction in the Gas Industry.—The report of the Education Committee on technical instruction relating to the gas industry in the London area [*ante*, p. 103], in which it was stated that detailed proposals for classes in gas-fitting for both junior and senior students will be considered in connection with the arrangements for the session 1915-16, has been formally received by the London County Council.

Bradford Municipal Water Supply.—The 1st inst. was the sixtieth anniversary of the taking over of the old Bradford Water-Works by the municipal authority; the transfer in 1855 having put an end to a great struggle between the Corporation and the Water Company of that time. Opposing Parliamentary Bills collapsed in 1853; and both parties prepared new schemes for submission to the next session. There was, however, a certain lack of enthusiasm in the Council, owing to another expensive dispute; while in the Company there was a disposition to come to terms. Therefore, in March, 1854, the Corporation bound themselves not to oppose the Company's Bill, and to take over their plant, powers, and liabilities. The total cost of the transaction to the Corporation was £237,965, of which £165,000 went to the Company, who got what they asked for—namely, £40 for each £20 share. The Corporation were also bound to carry out extensive construction works at Barden and Hewenden.

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Exhibition Salons of the Davis Gas Stove Co., Ld.
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and is confirmed by the fact that several important undertakings have recently adopted Nautilus Showroom schemes.

Plans, Specifications, and Estimates free.

The Nautilus Co., Ltd.
(Proprs.: The Davis Gas Stove Co., Ltd.)
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Wexford Gas Price Raised.—The Wexford Gas Company have intimated to the Harbour Board that, owing to the higher prices of coal, they have been obliged to advance the charge for gas 2d. per 1000 cubic feet.

Dublin Gas Workers' Wages.—It is announced that the Alliance and Dublin Consumers' Gas Company have made advances in wages to their employees as follows: Stokers, 2s. 4d.; engine men, 3s.; water-gas makers, 2s. 4d.; machine men, 2s. 3d; coal workers, 4s.; yard men, 2s.; boys under 18, 1s.

Excess Profits Tax.—In reference to the proposal to tax extra profits made during the war, Mr. Lough, in the House of Commons last Wednesday, asked "whether enterprises owned and carried on by municipal authorities of the nature of a trade or business will be liable to pay the proposed duty." Mr. M'Kenna's answer was in the affirmative.

Public Lighting of Maryport.—Considerable dissatisfaction has prevailed in Maryport owing to the policy of the Urban Council in keeping the streets in total darkness; and at the last meeting of the Council Mr. J. Dixon moved that half the lamps not coming under the Admiralty order be lighted. Mr. I. Hardy (Chairman of the Gas Committee) said their men had enlisted, and they had been replaced by inefficient men. The result was that the make of gas had fallen from 180,000 to 190,000 cubic feet per day to 130,000 cubic feet. They had not put up the price of gas, and they did not wish at this time, when the cost of living was rising, to still further reduce the value of the sovereign, though all through the country the price of gas had gone up. The first consideration for the Council must be the maintenance of a supply of gas for domestic purposes. The motion was defeated by 11 votes to 3.

Recruiting in a Gas-Works.—By invitation of Mr. George Clarry, Mr. W. T. Beavan, J.P., Lieutenant Henry Davies, Adjutant to the 2nd/5th Welsh Supernumerary Battalion, and Private Rossiter, from the Recruiting Office, appeared at the Cardiff Gas-Works early on Friday morning, and addressed a large body of workmen upon the pressing needs of the hour. For fully forty minutes the men stood silently listening to what was being said. Lieutenant Davies contrasted the labour conditions in Germany with those in Great Britain, and showed how much worse off British workers would be if ever they came under German rule. Mr. Beavan spoke of the necessity for sacrifice on the part of the employer and employee, if the war was to be carried through to a successful issue.

Ceara Gas Company, Limited—The annual general meeting of this Company will be held next Friday, when the Directors will present the accounts for the twelve months that ended June 30 last. The result of the year's working shows a loss of £2217, which, taken from the sum of £8083, the balance from last year, leaves £5866 to be carried forward. This result has been caused chiefly by the dislocation of business throughout the State of Ceará brought about by the war; while, in addition to this trouble, the State has been suffering from a very severe drought. Exchange is responsible for a loss of £2580. The Company has been most seriously inconvenienced by the non-payment of the public lighting accounts, which on June 30 were eleven months in arrear. During the year the Company paid heavily for coals and freight. Coal has now to be obtained in America, as the Government have prohibited export from this country. The Directors report the death of Mr. Cooper, who was Auditor to the Company from 1907. The Board appointed Mr. F. W. Church to audit the balance-sheet for the past year; but under the Articles of Association he is not eligible for re-election at the present meeting.

GAS COMPANIES IN THE STOCK EXCHANGE.

The improvement which was noted a week ago in the general position of things on the Stock Exchange was well maintained, and, indeed, in some lines advanced, in the week just closed. The cheerful tone which continued day after day bore witness to the confidence entertained in the markets. The pressure upon Serbia, and the differences of opinion indicated by the resignation of one important Minister in the British and another in the French Governments, could not shake the assurance felt in the House. Government issues were strong, and the War Loan steadily advanced. The result of the South African elections—which had been looked forward to with some anxiety—was a good factor. The splendid Canadian harvest, and the traffic statistics up to date, the improving condition of things in the South American States, and the more hopeful prospects in Mexico, were welcomed in the markets with rising prices. Japan also contributed to the advancing tide. In the Miscellaneous group, undertakings for the supply of the necessaries of war, and oils and rubbers, participated in the cheerful tone. Home Rails were almost alone in remaining outside the genial influence. The war-bonus concession made by the Government did not appear to make much impression; hopes being entertained that the Government would "stand the racket." But the ultimate position of the companies was a theme for grave reflection. Business in the Gas Market fell back again in point of volume, even after making allowance for a five-day week; and, in London, only five companies were dealt in at all. So far as business of such meagre proportions could afford any indication, the tone was firm and unchanged. Here and there a low price was accepted for an odd lot which had to be cleared. In the Money Market, the tendency was firmer. A considerable amount of gold was withdrawn for abroad. The question of the next War Loan was much discussed, and general expectation favours postponement till the New Year.

Bargains done for cash during the week were as follows: On Monday, British 35⅜, Gas Light ordinary 78, 78½, ditto preference 72½, 73, ditto debenture 62½, South Metropolitan 76, 76½. On Tuesday, British 35¼, 36, Gas Light ordinary 78, 78¼, 78½, ditto preference 73, Oriental 98. On Wednesday, Brentford "B" 86, Gas Light ordinary 78, 78½, 79, ditto debenture 62½, 62⅝, 63, South Metropolitan 76½, 76¾, 76⅞, ditto debenture 60½, 60¾, 60⅞. On Thursday, Brentford "B" 86, Gas Light ordinary 78, 78¼, 79, ditto debenture 62⅝, 63, Liverpool 93½, South Metropolitan 77, ditto debenture 60⅝. On Friday, British 35⅝, 36, Gas Light ordinary 78, 79. The Exchange was closed on Saturday.

The Bank rate is 5 per cent.—as fixed on Aug. 8, 1914.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING OCT. 23.

Issue.	Share.	When ex-Dividend.	Previous Div on Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.
£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	5½	Alliance & Dublin Ord.	59—64	3 18 2
374,000	"	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 3
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	5 17 8
50,030	10	Feb. 26	16	15/-	Bournemouth Gas and Water — 10 p.c.	29—30	5 6 8
878,480	10	"	7	7/-	Bournemouth Gas and Water — B 7 p.c.	15—15½	4 10 4
95,000	10	"	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13½—14	4 5 9
—	—	—	—	4	Bournemouth Gas and Water — Deb.	..	—
880,000	Stk.	Feb. 26	†14	56/-	Brentford Consolidated	261—266	5 5 3
880,000	"	"	†11	55/-	Do. New	204—209	5 5 3
50,000	"	"	5	5	Do. 5 p.c. Pref.	109—111	4 10 1
206,250	"	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0
217,380	Stk.	Feb. 26	11	10⅜	Brighton & Hove Orig.	208—213	5 3 4
244,200	"	"	8	7⅜	Do. A Ord. Stk.	154—159	5 0 8
530,000	20	Mar. 26	12½	22/6	British	44—45	5 11 1
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11
945,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1⅛—2⅛	—
100,000	10	—	—	4 6	Do. 4½ p.c. Pref.	4 —6	—
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11
1,513,280	Stk.	Feb. 12	5/9/4	49.4	Commercial 4 p.c. Stk.	106—108	5 1 2
560,000	"	"	5½	46/8	Do. 3½ p.c. do.	103—105	5 1 6
475,000	"	June 11	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11
800 000	Stk.	"	4	4	Continental Union, Ltd.	76—79	5 1 3
200 000	"	"	7	7	Do. 7 p.c. Pref.	115—118	5 18 8
—	—	—	—	11½	Croydon B and C 7 p.c.	..	—
4 2,270	Stk.	—	6	6	Derby Con. Stk.	128—135	4 16 0
55,000	"	—	4	4	Do. Deb. Stk.	102—104	3 16 11
1,002,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1
16,864,910	Stk.	Feb. 12	4/17/4	4 /-	Gas Light and Coke — 4 p.c. Ord.	98—102	4 15 6
2,600,000	"	"	3½	3½	Gas Light and Coke — 3½ p.c. max.	76—79	4 8 7
4,062,235	"	"	4	4	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	4 0 10
4,674,850	"	June 11	3	3	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	4 0 6
180,000	"	"	10	—	Gas Light and Coke — 10 p.c. Bonds	..	—
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16¾	6 11 4
—	—	—	—	9½	Hornsey 7 p.c.	..	—
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C	151—154	5 2 4
65,780	"	"	6½	6½	Do. B	115—118	5 8 0
65,500	"	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5
200,242	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5
561,000	Stk.	Feb. 26	10	10	Liverpool 5 p.c. Ord. — A	211—213	4 13 11
718,100	"	"	7		Liverpool 5 p.c. Ord. — B	146—14	4 14 7
306,083	"	June 26	4	4	Do. 4 p.c Pr. Deb. Stk.	..	—

Issue.	Share.	When ex-Dividend.	Previous Div on Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.
£			p.c.				£ s. d.
75,000	5	June 11	6	4/-	Malta & Mediterranean	4¼—4⅝	6 9 9
250,000	100	April 1	4½	4½	Met. of Melbourne — 4½ p.c. Deb.	99—101	4 9 1
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 18 4
1,775,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6
529,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	89—93	4 4 10
55,940	10	Feb. 26	7/14/0	7/8/2	North Middlesex 7 p.c.	14—15	5 2 8
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	6 9 0
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	4 19 8
100,000	50	"	12	60/-	Do. C	118—121	4 19 2
52,000	50	"	10	—	Do. D	..	—
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	6 18 4
499,960	5	June 26	5	2/6	" 5 p.c. Pref.	4⅝—5	5 0 0
521,600	100	June 2	4	4	" 4 p.c. Deb.	91—93	4 6 0
—	—	—	—	4	" " 1911	..	—
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0
150,000	10	May 14	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	5 9 1
125,000	50	July 1	5	5	San Paulo — 5 p.c. Deb.	47—49	5 2 0
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	4 9 3
209,984	"	"	10	10	Do. B	222—224	4 9 3
523,500	"	"	10	10	Do. C	220—222	4 10 1
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6
6,429,895	Stk.	Feb. 12	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8
1,895,445	"	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	4 0 6
209,820	Stk.	Feb. 26	8½	8½	South Shields Con. Stk.	157—159	5 6 11
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5
60,000	"	"	5	5	Do. 5 p.c. Pref.	110—112	4 9 3
—	—	—	—	42/4	Do. West Kent.	..	—
137,058	"	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9
629,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0
120,000	Stk.	Feb. 12	7½	7½	Tottenham and District — A 5 p.c.	135—138	5 8 8
742,275	"	"	6	6	Tottenham and District — B 3½ p.c.	115—117	5 2 7
181,255	"	June 26	4	4	Tottenham and District — 4 p.c. Deb.	87—89	4 9 11
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	8 6 8
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3
236,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4
30,000	Stk.	Feb. 26	8⅜	78/9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	5 7 4
255,636	"	"	6½	63/9	" B 3½ p.c.	129—134	5 2 7
108,075	"	"	5/17/8	58/1½	" C 3½ p.c.	110—115	5 2 0
352,000	"	"	6½	£7.6	Wimbledon 5 p.c.	117—122	5 0 5
98,000	"	"	6½	63,9	Epsom 5 p.c.	121—126	5 5 2
88,416	"	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11

*** For List of Lowest and Highest Prices of Bargains, see last paragraph of article above table.

† Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

North Warwickshire Water Company.

In the Companies Winding-up Court (Chancery Division), on Tuesday last, the petition of the Coventry Corporation for a compulsory order to wind-up the North Warwickshire Water Company came before Mr. Justice Astbury, when Mr. H. E. Wright said it had been arranged, subject to his Lordship's approval, that the petition should be dismissed without costs. His Lordship assented, and the petition was dismissed without costs.

Better Street Lighting Suggested for London.—In the course of a letter to the Kensington Borough Council, pointing out the desirability of securing greater uniformity of street lighting in the Metropolitan area, the Office of Works state that local authorities should endeavour to obtain equality of lighting treatment, and excessive diminution of street lighting was to be deprecated. The suggestion is made that 75 per cent. of all lamps in side streets should be in lighting. The reduction in main road lighting, it is pointed out, has in some instances been excessive; and more lamps may be employed in such streets. All lamps on street refuges could be in lighting without exception, providing they were properly masked.

Trade Unionists Officials as Committeemen.—A resolution was moved by Mr. Leonard Foster (the Chairman of the Gas Committee), at a meeting of the Sedgley Urban District Council, to the effect that, "in the opinion of the Council, it was undesirable and inexpedient that a member who was an official of a trade union whose operations might at any time come into opposition with the Council's work should serve on the Gas Committee." He referred, he said, to Mr. H. Hickman, who was on the Gas Committee and at the same time was Chairman of the local branch of the Gas-Workers' Union. He charged Mr. Hickman with causing discontent among the men who were engaged in laying gas-mains. He desired an expression of opinion from the Council in respect of the matter; and if he failed to get a favourable one, he should resign his position as Chairman of the Gas Committee. Mr. Hickman said he had never sown seeds of discord among the workers; and Mr. Foster had always had his loyal support on the Committee. Mr. J. T. Tennant (a former Chairman of the Gas Committee) suggested that the resolution should be withdrawn; remarking that Mr. Foster's purpose had been served, and it was now a matter for Mr. Hickman's conscience. Mr. Foster agreed to this course.

Public Lighting of Holborn.—The Borough Surveyor of Holborn (Mr. E. F. Spurrell) reports that, under the terms of the public lighting contract, the Gas Light and Coke Company and the Metropolitan Electric Supply Company agreed to instal the new lighting system and supply illuminant, light, cleanse, extinguish, and maintain the whole of the lamps within the borough, and give an illuminating power of 424,140 candles, for a period of ten years, for the sum of £7645 per annum as from Jan. 1, 1913. Deductions or additions in the lighting units are charged or deducted at prices set forth in a schedule attached to the contract. To guard against air raids, the Council, at the request of the Government, materially reduced the lighting of the streets. The Electric Light Company could not see their way to make any monetary allowance; but the Gas Light and Coke Company, who supply gas to a large area, allowed the sum of £300 for the year under review. There are 966 electric and 878 gas lamps in the borough; the total candle power of the electric lamps being 194,450, and of the gas-lamps 233,300.

By a fire which broke out last Monday week at the Newquay Gas-Works, two engines were practically destroyed, and the engine-room gutted.

At the Dublin Southern Police Court, a youth aged 17 was fined 10s. for lighting public lamps before the hour at which they would have been lighted by the Corporation, thereby wasting gas the property of the Alliance and Dublin Consumers' Gas Company. Another boy of 13 was fined 2s. 6d. for a like offence.

British Dyes, Limited, have chosen a site at Huddersfield for the proposed new works, near to that occupied by Messrs. Read Holliday and Sons, whose works were purchased by the Company to form the nucleus of the larger concern. The whole new site occupies an area of 450 acres, 250 acres of which will be taken up by the works; the remainder being available for extensions, &c.

At a meeting of the General Purposes Committee of the Dewsbury Town Council, it was stated that arrangements had been made with the Huddersfield Corporation for a supply of water to the Ravensthorpe part of the borough, in case of necessity; and that satisfactory terms had also been arrived at with the Sheffield millowners, who have a claim upon the Water Board for a regular supply of water in the shape of compensation.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Hebden Bridge Gas Board. Applications by Nov. 3.
ASSISTANT (Montevideo Gas Company). Applications by Nov. 13.
CHARGE OF GAS PRODUCING PLANT. No. 828, c/o Robertson and Scott, Edinburgh.
WORKING FOREMAN. Hebden Bridge Gas Board. Applications by Oct. 30.
CLERK. Reigate Gas Company.
TESTERS (Gas-Fires, &c.). No. 6107.
FITTERS. No. 6106.

Appointments, &c., Wanted.

AGENCY OR REPRESENTATION. No. 6111.

Plant, &c., Wanted.

TANK-WAGGONS. No. 6113.
THERMOSTAT. No. 6112.

Process Wanted.

NAPHTHALENE SEPARATION AND REFINING. No 6104.

Meetings.

CEARÁ GAS COMPANY. 9, Queen Street Place, E.C. Oct. 29, One o'clock.
IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel, Nov. 11, 2.30 o'clock.

Sales of Stocks and Shares.

GRAYS AND TILBURY GAS COMPANY. Tenders by Nov. 4.

TENDERS FOR

Oxide of Iron.

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NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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Secretary.

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Clauses and Precedents in

ELECTRICITY, GAS, & WATER LEGISLATION.

Being a Comparison of the Provisions contained in the Model Bills, in Special and Municipal Acts, and in Provisional Orders, 1910 to 1914, relating to these Public Services.

Compiled and noted by **JACQUES ABADY,** of the Middle Temple, Barrister-at-Law.

WALTER KING, "JOURNAL" OFFICES, 11, BOLT COURT, FLEET STREET, LONDON, E.C.